NUTTALLBURG MINE COMPLEX ~~(Dubree No. 4)~~
North side of New River, 2.7 miles
upstream from Fayette Landing
Lookout vicinity
Fayette County
West Virginia

HAER No. WV-51

HAER
WVA,
10-LOUT.V,
1-

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

REDUCED COPIES OF MEASURED DRAWINGS

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
1849 C Street, NW
Washington, DC 20240

HAER WVA, 10-LOUT.V, 1-

HISTORIC AMERICAN ENGINEERING RECORD

NUTTALLBURG MINE COMPLEX 1873 HAER No. WV-51

Location: North side of the New River, 2.7 miles upstream from Fayette Landing, Fayette County, West Virginia. Lookout Vic.

UTM: Mine Opening, 17.496325.4211600
Tipple, 17.496240.4211205
Quad: Fayetteville, West Virginia

Fabricator:
Tipple: Roberts and Schaefer Company
Chicago, Illinois
Headhouse: Fairmont Mining Machinery Company
Fairmont, West Virginia
Conveyor: Fairmont Mining Machinery Company
Fairmont, West Virginia

Date of Construction:
Mine, 1873
Tipple, 1923-24.
Headhouse/Conveyor, 1925-26.

Present Owner: The John Nuttall Estate

Present Use: None

Significance: The Nuttallburg Mine was one of the earliest mines to open in the New River Field. The Retarding Conveyor is one of the longest ever constructed and perhaps one of the few still extant. The Nuttallburg Mine Complex is representative of the rural industrialization and is typical of the extractive industries located in the New River Gorge and West Virginia.

Project Information: The Nuttallburg Mine Complex recording project was undertaken during the summer and fall of 1991 by the West Virginia University Institute for the History of Technology and Industrial Archaeology for the Historic American Engineering Record.

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Preface

A clear need exists to document America's industrial heritage before it molders back to nature or is razed to make way for new malls. For example, America's once mighty steel industry has been in steady decline since the early 1970s and now forms the basis for the "rust belt." Mechanization of coal mining has resulted in fewer jobs for fewer miners, and the 1990 Clean Air Act sounds the death knell for the high-sulfur bituminous coal industry.

Fortunately, the Historic American Engineering Record (HAER) program was established to document significant American industrial and engineering works. HAER has undertaken the recording of not only steel mills and coal mines, but also bridges, tool works, maritime vessels, canals, railroads, and other relics of our industrial past. With this in mind, the West Virginia University Institute for the History of Technology and Industrial Archaeology proudly presents its premiere HAER level recording of an industrial site: the Nuttallburg Recording Project. The following narrative report, entitled "The Nuttallburg Mine Complex" is the historical component of the standard HAER documentation package. The remaining components include measured drawings and large format photography.

The Institute was founded in 1989 as an institute of academic and professional excellence to support public and private programs concerned with the history of technology, industrial archaeology and the preservation of engineering works. For the past two decades members of the Institute staff have been extensively involved in teaching and research in the history of science and technology and in the new field of industrial archaeology, utilizing a multi-disciplinary approach to historic preservation and interpretation of industrial and transportation sites. In addition to director Emory L. Kemp, who is a structural engineer, there are historians, landscape architects, and other preservation oriented professionals working with the Institute who have experience in the field of site recording using advanced techniques of photogrammetry and cartography. The Institute also enjoys a close professional affiliation with a leading firm of preservation architects, who have participated in a number of relevant projects. The Institute serves not only projects throughout West Virginia and the Appalachian Region, but also those of national significance elsewhere.

The following narrative report has two principal components. The first part focuses on the corporate aspects of the mine site and the second examines the technological considerations of the Nuttallburg Mine Complex. **Part I** is entitled **"The Corporate History of the Nuttallburg Mine Complex,"** with the subsequent discussions further refined into sections. **Section 1.1, "New River**

Gorge Introduction," is intended to introduce the reader to the geography and early history of Fayette County, the construction of the Chesapeake and Ohio Railway, and the subsequent opening of the New River Field.

Section 1.2, "The Evolution of the Nuttallburg Mine Complex," documents the corporate history of the Nuttallburg Mine and the subsequent growth of the village of Nuttallburg. Specifically, the narrative traces the establishment of the mine site and changes in the mine's ownership. The narrative begins with the early life and times of John Nuttall. The ensuing sub-sections focus on the history of the mine and are broken down into eras which relate to specific years of mine ownership, as this is the most obvious and convenient way to break up the narrative. Lastly, a short essay gives a glimpse of life at the village of Nuttallburg.

Part II, "The Technology of the Nuttallburg Mine Complex," examines the types of and changes in the technology utilized at the Nuttallburg Mine to extract, convey, and process coal. During the course of operations at the Nuttallburg Mine, the technology used to mine and process coal changed drastically. This change was manifested in many ways. For example, traditional pick mining was superseded by coal cutting machinery; hand loading coal changed to machine loading; mechanical haulage replaced animal powered haulage; gravity screens evolved into shaker and vibrating screens; and coal washing, once disregarded, became standard practice. This part of the narrative tracks the shift of coal mining from the traditional methods of the nineteenth century to the advent and implementation of mechanization in the early-to mid-twentieth century. The Nuttallburg Mine may be viewed as a case study in the mechanization of coal mining.

Section 2.1 is an introductory section to the technology of the site with an explanation of the themes used in **Part II** of the narrative. The **"Introduction"** also gives a general description of the movement of coal from the Mine to the Tipple.

Narrative **Section 2.2, "Extracting, Conveying, and Processing Coal,"** documents the technology employed to win, transport, and sort coal from the mine to the tipple. This section has been developed thematically and is intended to be read either together, for a complete explanation of coal movement from the bench to the tipple, or individually as case studies in mining and processing technology.

Section 2.3, "Ancillary Mine Structures," examines those structures and processes related to the mining and processing coal, which do not fit into the categories in **"Extracting, Conveying, and Processing Coal."** Topics discussed include Mine Ventilation, Powerhouses and Substations, Cap and Powder Houses and other

dependencies important to the mine operation. Also included is a discussion of Miscellaneous Shops and Buildings. This includes structures such as the lamp house or the mine office that ordinarily would be located at a mine site, but are not readily identifiable or locatable at the Nuttallburg Mine.

Section 2.4, "Transportation," examines the transportation systems at Nuttallburg. In particular the Underground and Surface Haulage systems, the Hoist House and Mountain Haulage, and the Nuttallburg Suspension Bridge.

Section 2.7, "Appendices," contains supplemental information about the mine and its operation, documenting the equipment and housing at both the Nuttallburg and Keeney's Creek mines in 1903. Included are tabulations of the mine's coal production, coke production, mine employment statistics, and a comparison of the Nuttallburg Mine with the Twin Branch Mines during the Ford era. The last two appendices include historic photographs and illustrations which are included to help clarify and understand the text. It should be noted that the historic photographs and illustrations were electronically scanned, using a Microtek Scan Maker. Each photograph has been captioned and the repository of the each of the photographs is included parathetically beneath each caption. Both the illustrations and photographs are keyed into the text.

Acknowledgements

The research and preparation of a narrative of this length and breadth required more than one person's effort. The field recording team deserves special recognition for their tireless efforts in the humid New River Gorge often hiking into and out of the site. This team consisted of Institute staff delineators Kevin McClung, John Rudman, Paul Boxley, Joe Condie, and surveyor and assistant historian Ed Winant. Council of International Programs participant, Mine Kangal, of Turkey, provided additional help. Likewise, the studio team merits a special thanks for their excellent work. The studio delineators included staffers Kevin McClung, Paul Boxley, John Hriblan, John Rudman, and Joe Condie.

In addition to the field and studio teams, the project involved many other people. The Institute staff was very important in executing this project, particularly Michael "Eddie" Workman and Billy Joe Peyton for their time and help in editing this document. Staffer Michael Caplinger also helped during one of the many returns to the site for more measurements and investigations. Institute secretaries Rena Taft, Donna Cayton, Carol Lones, and Karen Lemley deserve special thanks for managing the recording team's travel and other expenses, and for generally seeing that things moved as smoothly as possible on their end. Lastly, formal large format photography was conducted under the direction of Institute Director, Dr. Emory L. Kemp, who deserves special thanks for the enthusiasm he brings to projects such as the Nuttallburg Recording Project.

The staff of the West Virginia and Regional History Collection merit special thanks, particularly Annette Cotter and David Bartlett for their help in locating collections and other archival materials. The New River Gorge National River Park Library deserves thanks for furnishing the author with valuable maps, photographs and documentation on John Nuttall, with special thanks to Reba Scott, Park Librarian. A very special thanks to Thomas Eiff, Nuttall Trustee, who made it possible for the team to work on-site, and who was very helpful in providing the author with contacts for investigation.

Lastly, I dedicate this work to my parents.

Methodology

The HAER level Nuttallburg Recording Project constituted the combined efforts of a team of Institute staff delineators and historians with two distinct phases. The field work and historical research occurred during the first phase. In the second phase, after returning to studio and office, the measured drawings and historical narrative were prepared.

In late May 1991, the first phase began when the recording team entered the field and began sketching and measuring the structures that comprise the site. This process took approximately eight weeks to complete. The field team sketched and measured the principal extant structures, namely the Tipple, Headhouse, and Conveyor. Other important structures such as the Hoist House, Fan House, and Coke Ovens were also documented at this time.

While the recording team worked in the field, the historian began to research the historical narrative. He made extensive use of the materials available in the West Virginia University Library System at Morgantown, undertaking a very time consuming and tedious examination of the industry trade journal Coal Age, for the years 1912 to 1950. Coal Age is perhaps the best source for documenting the changes in coal technology that occurred during the early part of the twentieth century. Additionally, Coal Age offers a plethora of material on tipple and screening technology, conveyor technology, mining technology, actual and representative illustrations and photographs relating to Nuttallburg, and general information on the various West Virginia coal fields. Information contained in Coal Age formed the basis for the narrative documentation of the equipment and processes used at the Nuttallburg Headhouse and Tipple. Other useful journals include Mines and Minerals, Modern Mining, and The Coal Industry. Another source of pertinent information on coal mining and processing technology and processing equipment are the Keystone Coal Buyers Catalogs and the Keystone Coal Mining Catalogs. In addition to trade journals and catalogs, the historian painstakingly examined every West Virginia Department of Mines Annual Report, from the first 1883 report to the 1960 report (it should be noted that the second annual report was not released until 1895). These mine statistics tracked changes in coal mining technology such as the advent and use of coal cutting machinery, the number of mine locomotives used by a particular mine, or the number of and production from loading machines. In addition to documenting technological trends, the reports give individual mine output statistics for Nuttallburg, as well as county and state coal output.

The historian used archives in West Virginia and Pennsylvania to locate historic maps, photographs and other archival information

pertaining to the Nuttallburg Mine site. Archives visited include the West Virginia and Regional History Collection, West Virginia University, Morgantown, West Virginia; the State Archives, Charleston, West Virginia; Pentree Resources, Princeton, West Virginia; and The Carnegie, Library of Pittsburgh, Science and Technology, and Pennsylvania departments.

Trees Above, with Coal Below, John Nuttall II, proved an excellent source of primary material on the Nuttallburg Mine. Trees is, in fact, the Nuttall family history discussing their early years in the gorge, but also contains pertinent information about the mine's early operation and technology of that period. Additional primary information on John Nuttall's early life and times was gleaned from the unpublished manuscript "The Life of John Nuttall," also by John Nuttall II, made available by the New River Gorge National River Park Library.

The historian made numerous trips to the site to evaluate extant remains and to form speculative opinions about process and the missing equipment. These field examinations, were aided by the recording team, who regularly conversed with local residents about the history and operation of the mine and its various ancillary structures.

The second phase of the recording project was the return to the office and studio to prepare the final documentation package. However, things never go as smoothly as planned, and this was period continuing historical research, locating photographs, and examining mine statistics all while writing the narrative. Likewise, the recording team once in the office and laying out the drawings found it necessary to return to the field for missed measurements and other examinations. The historian often accompanied the recording team into the field for these new measurements hoping to glean new understandings of the processes employed at Nuttallburg.

In the midst of this chaotic period, members of the recording team returned to the field for the formal large format photography of the site's extant remains. The structures were photographed to HAER standards using a 4x5 view camera. The Headhouse, Fan House, Conveyor, Hoist House, Coke Ovens, and Tipple were all documented using this medium.

The Nuttallburg Recording Project, despite many setbacks, it was completed during the late winter of 1992. In the end it was well worth the time and effort to execute and complete this project.

Introduction

The word "revolution" as defined by Crane Briton in his excellent work, The Anatomy of Revolution, means a sudden or striking change. The word revolution also means rotation; this definition implies a return to a point of beginning. Political upheavals follow a pattern with sudden change, resulting in an old regime being replaced by a new one. Briton points out that inevitably there is a counterrevolution and the old or neo-old regime returns to power. For example, witness the American, French and Russian revolutions. All three have the characteristics of the overturning of the government, the emergence of a new order, and the return to the old order. This cycle is very subtle as with the American Revolution, but much more dramatic with both the French and Russian revolutions. Both definitions of revolution apply to these examples; that is, sudden change and a return to a point of beginning.

The cyclical nature of revolutions are also true for industrial revolutions. First, society's reliance on goods from small scale "cottage industries" or outside sources; then the striking change of heavy industrialization resulting in self sufficiency; followed by a period of leveling and decline, often returning to a state of dependence upon outside or foreign goods. This is nowhere more true than in the New River Gorge where the rugged natural beauty suddenly disturbed with the arrival of the Chesapeake and Ohio Railroad and the land manipulated by men and machines to extract and process coal has now returned to its natural state. This succession of events was the result of the Industrial Revolution in the mid-nineteenth century America.

The Industrial Revolution of the eighteenth and nineteenth centuries was the result of certain political, social, and economic factors and conditions that were first met in Great Britain, and later, America. But what underlay this rise to industrial prominence was an abundant source of raw materials, particularly iron and coal.

Historians of technology have argued that Iron Bridge, Coalbrookedale, England was the birthplace of the Industrial Revolution, where in 1709 iron was first smelted using coke, a product of coal. The timber resources of Great Britain had been greatly depleted by the early eighteenth century and a new fuel source for smelting iron was needed. On the other hand, other historians argue that the Industrial Revolution began at Castle Howard in 1712 with the advent of the first practical steam engine. (The Necomen steam engine was coal fired and ironically was first used to pump water from coal mines.) Indeed, the steam engine as the prime mover of the Industrial Revolution was used not only to clear mines of water, but also to power textile looms, operate the

bellows for blast furnaces, and provide motive power for steam locomotives. Any practical application of the steam engine required coal as the basic energy source and large quantities of it. Thus it is clear, from these examples that coal was the key fuel of the Industrial Revolution.

The British Industrial Revolution predates the American Industrial Revolution by approximately one-hundred years. Like its British counterpart, the American Industrial Revolution was kindled by coal. It began during the antebellum years but began flourishing in the decades immediately following the Civil War, bringing America to the world's industrial forefront. The rapid growth of the American iron industry was fueled by the seemingly boundless reserves of the American coal fields. Not only did the iron and steel plants use coal and coke, but coal was also the fuel for steam locomotives that enabled transcontinental trade and settlement. More fundamentally, it heated peoples homes and cooked their meals.

Often, the problem laid not in locating or extracting coal, but rather transporting it to a market. This was certainly the problem in the New River Gorge. It was known from the time of the earliest settlers that coal seams outcropped along the high gorge walls. This coal was mined and used for local purposes, such as heating and smithing. The principal difficulty with exploiting the New River Field was the lack of transportation. This was solved by the construction of the Chesapeake and Ohio Railway during the early 1870s. Perhaps the sudden rise in coal production is most indicative of the C&O Railway's impact on West Virginia's mining history. During the early 1870s, the state's coal production averaged about 650,000 tons annually, however, in 1874, the C&O's first full year of its operation, the state's annual production nearly doubled, with 1,120,000 tons being produced. Indeed, the C&O Railway had a profound effect on the development of the New River Field.

The Nuttallburg Mine Complex is located on the north side of the New River Gorge, in Fayette County, West Virginia. This significant mine site was one of the earliest to operate in the New River Field. The mine was opened in 1873,by John Nuttall, an English immigrant and Pennsylvania capitalist, in anticipation of the C&O Railroad's construction. Nuttall, a self made man in the true style of Sir Samuel Smiles, who believed anyone who worked hard could rise to a prominent position of wealth and responsibility, is the unsung hero of the New River Field. The general histories of the West Virginia Smokeless Coal Fields, identify Colonel Joseph Beury as the pioneering capitalist in the New River Field. Furthermore, the literature invariably credits those who followed Beury, men such as Justus Collins, George Henry

and W. Gaston Caperton, and Thomas and William McKell as trailblazing capitalists, but seldom mentions Nuttall. One of the purposes of this paper is to give the credit due to John Nuttall as a pioneering force in the New River Field.

The Nuttall family maintained ownership of the mine for several decades, but eventually leased the property and mineral rights to outside operators. The most famous operator was Henry Ford, the renowned American automaker, who purchased the leasehold in 1920. It was during the Ford era that the Headhouse, Retarding Conveyor (when constructed, it was considered the longest of its kind), and Tipple were erected, during a period of extensive renovations. Ford hoped to make the mine more productive, and instituted a program of modernization at the mine. Ultimately, this program would only have limited results.

Late in the 1920s, the mine was acquired by the Maryland New River Coal Company, who operated it until 1953. The Garnet Coal Company leased the mine in 1954, and operated it until 1958 when all mining activity ceased.

Part I: The Corporate History of the Nuttallburg Mine Complex

Section 1.1 New River Gorge Introduction

Fayette County Geography

Fayette County is located in the south central section of West Virginia and is bounded by Kanawha, Nicholas and Clay counties to the north; by Nicholas and Greenbrier counties to the east; by Summers and Raleigh to the south; and by Kanawha and Raleigh counties to the west, enclosing a total of 666.5 square miles.[1] The topography of this region features high ridges and plateaus with deep valleys. The elevation of Fayette County varies from 597.7 feet above sea level at Montgomery to 3375 feet above sea level on the crests of Sewell Mountain.[2]

The New River, the second oldest river in the world (the Nile is considered the oldest), is Fayette County's principal river. With its headwaters high in the Blue Ridge Mountains, the New River flows northwesterly out of North Carolina through Virginia into West Virginia, meandering through the heart of the county. At Gauley Bridge, the New River joins with the Gauley River to form the Great Kanawha River. Fayette County lies entirely within the watershed of the Great Kanawha River, that is, all watercourses in the county ultimately drain into the Great Kanawha basin. The county's principal tributaries of the Great Kanawha are Mann's Creek, Keeney's Creek, Laurel Creek, Mill Creek, Meadow Creek, Wolf Creek, Arbuckle Creek, and Dunloup Creek, draining 326.4 square miles.[3] The New River in Fayette County carves a deep gorge that today contains the New River Gorge National River.

Early History of Fayette County

Fayette County was formed on February 28, 1831 from Kanawha, Nicholas, Greenbrier, and Logan counties and was named for the Frenchman and American Revolutionary War hero, General LaFayette. In 1850 Raleigh County was created from part of Fayette and in 1871 another part of Fayette was used to form Summers County. The first county seat was located at New Haven, but was moved to Vandalia. Vandalia was founded by Albert Vandal and was renamed Fayetteville in 1837.[4]

The earliest inhabitants of this mountainous country were Native Americans. The area was primarily used as the hunting grounds of the Delaware, Shawnee, and Mingo tribes. This began to change when, in 1713, the region came under the hegemony of the Iroquois tribe, who were expanding their territory and their domination over other eastern tribes.[5] The Fayette County region

was rugged and isolated, but ultimately European and other white explorers penetrated the mountains, searching for a passageway to the west.

The first explorers to discover the New River are said to have been Virginian's Thomas Batts, Thomas Wood and Robert Fallam. These men named the New River "Wood's River", in honor of Abraham Wood, an early Virginia explorer. Virginia Colony Governor William Berkeley commissioned these men to explore the Trans-Montaine Region and to find "the ebbing and flowing of ye South Sea or of the water on the other side of ye mountains." In September 1671, the explorers left from near the present day city of Petersburg, Virginia. During the course of their travels, the trio followed the watercourses westward, they crossed the New River and traveled over the mountains to near present day Matewan, West Virginia on the Tug Fork River.[6] In their month long journey, Wood, Batts, and Fallam were the first non-Native Americans to view the New River, but others that followed would begin to explore and inhabit the Fayette County region.

The region remained virtually unexplored and uninhabited by white settlers for nearly another one hundred years. This began to change in 1748, when the Ohio Company of Virginia was formed to settle the territory drained by tributaries of the Ohio River. This territory included the watersheds of the New and Kanawha rivers. An early traveller to the Ohio Country was North Carolinian Christopher Gist, surveyor, explorer, and sometime companion of George Washington, who in 1750 descended the Ohio River from the Forks of the Ohio to the Falls of the Ohio at present day Louisville, Kentucky. After his return to Tidewater Virginia, Gist was sent back to the Ohio Country in late 1751 to explore the lands between the Monongahela and the Great Kanawha rivers. During the course of his explorations, Gist traveled down the Ohio River to the mouth of the Great Kanawha River (at present day Point Pleasant, West Virginia), venturing up the Great Kanawha River to the New River and further up to the mouth of the Greenbrier River. On his return, Gist explored the lands comprising the modern West Virginia counties of Tyler, Pleasants, Mason, Jackson, and Wood.[7]

It was not until after the Seven Years' (French and Indian) War that the Fayette County region began to be settled. In 1768, William Johnson, Superintendent of Indian Affairs for the British government, negotiated the purchase of the lands bounded by the Allegheny Mountains to the east, the Ohio River to the west, the mouth of the Tennessee River to the south and Kittanning to the north, above the Forks of the Ohio at Fort Pitt. The Treaty of Fort Stanwix, as this land acquisition was known, led to the settling of the lands west of the Alleghenies once held in reserve for the Indians under the dictates of the Royal Proclamation of

1763. (The Royal Proclamation was an unsuccessful decree designed to prohibit settlement west of the Alleghenies, thus reducing the pressure of westward expansion of the tribes in the region and the threat of marauding tribes raiding settlements. However, the British government had no real control over individuals who entered the region and settled.) After the Treaty of Fort Stanwix was signed, these new lands were settled by veterans of the Seven Years' War, who were granted land patents for their military service.[8]

The veteran landseeker possessing a land warrant could petition the local county surveyor for a tract of land and take possession of the property, or the bearer could trade the patent to another. Also, a person could settle on land as a squatter or under corn title. A squatter simply staked a claim, clearing the land to be farmed and building a cabin. The squatter had no legal right to the land, but could gain title to the property if the original patent was never claimed. A corn title was similar, in that the pioneer cleared the land and planted corn. The planting of corn was recognized as a form of land title. The first patent survey within the bounds of the present Fayette County was granted to Henry Banks for 40,680 acres of land on the New River in 1785. By the time Fayette County was formed in 1831, well over 50 land patents had been granted for Fayette lands. These land grants continued until after the Civil War, totaling over 400 patents being issued.[9]

Fayette County was settled using these practices and by 1840 the county had a population of approximately 3,900. By 1870, its population had nearly doubled to 6,700 and by 1880, the county's population had almost tripled to 11,600 people.[10] The population growth of Fayette County during the 1870s can be attributed to two very important factors: the construction of the Chesapeake and Ohio Railway and the subsequent opening of the New River Coal Fields.

Construction of the Chesapeake and Ohio Railway

Historically, the New River has been a corridor for passage to the west, used as such by both Native Americans and pioneer settlers. George Washington recognized the value of this waterway and in 1784 he planned and surveyed a canal, the James River and Kanawha Canal.[11] This canal was to link the tidewater port of Richmond with the Ohio River, and hence to New Orleans via the Mississippi River. When completed, this canal would allow the transportation of finished and raw goods within the backcountry, as well as unifying the young country by connecting the interior with the more established coastal cities. This canal would follow the James River through the Appalachians then following the Greenbrier,

the New, the Great Kanawha rivers to the Ohio. This monumental undertaking was to be constructed entirely within the bounds of Virginia. Proposed in 1784, the James River and Kanawha Canal had reached Buchanan, Virginia by 1851, a total of 160 miles. After the mid-1850s, any plans for the completion of the canal to the Ohio River were abandoned, never to be resurrected.[12] The failure to finish the canal can mostly be attributed to sectionalism and inadequate funding. Because the state failed to adequately fulfill the need for internal improvements, rampant sectionalism would plague western Virginia, causing its inhabitants to feel disenfranchised from the Tidewater government. This disenfranchisement ultimately led to the creation of the State of West Virginia in 1863. While the canal failed to reach the Ohio River, the Virginia legislature did authorize and fund a turnpike to connecting the canal with the Ohio.

In 1821 the Virginia legislature authorized the construction of a road to connect Covington, Virginia (then the western terminus of the canal) with the mouth of the Big Sandy River on the Ohio at present day Huntington, West Virginia. The road, known as the James River and Kanawha Turnpike, or the Kanawha Road was completed in 1826, from Covington to Kanawha Falls (Glen Ferris, West Virginia), and later, in 1827, the road was pushed to a point 26 miles above Charleston. Finally, in 1829 the legislature authorized the completion of the turnpike to the Big Sandy, and it was completed in the same year.[13]

The James River and Kanawha Turnpike was one the earliest roads to be constructed in Fayette County and roughly followed an old Indian Trail called the Buffalo or Kanawha Trail. The turnpike was the focus of activity by both Union and Confederate forces in Fayette County during the Civil War. The Kanawha Road and the New River corridor were the chief highways into the greater Kanawha Valley and thus changed hands many times in the early years of the conflict, with action at Gauley Bridge and others major gaps or crossings.[14] The James River and Kanawha Turnpike served to connect the canal with the Ohio River and was the major transportation artery in western Virginia and later West Virginia until the building of the Chesapeake and Ohio Railway.

Long before the construction of the Chesapeake and Ohio Railway, a plan to construct a railroad connecting the Ohio River and the Atlantic Ocean was proposed by Claudius Crozet, the great Virginia engineer. During the 1830s, Crozet proposed the construction of a railroad to replace the James River and Kanawha Canal then under construction. This was however, the era of canal building mania and his plan was opposed, being ultimately discounted.[15] Crozet was not alone in his dream of building railroads, as Virginia capitalists did construct several railroad lines in the decades before the Civil War, including the Louisa

Railroad, the Blue Ridge Railroad, the Covington and Ohio, and the Virginia Central.

The origins of the Chesapeake and Ohio Railway can be traced to 1850 when the Virginia Central Railroad Company was incorporated. The successor to the Lousia Railroad, the Virginia Central was begun in 1850 as an extension line from Chesapeake Bay to the Ohio River. This extension line was chartered as the Covington and Ohio Railroad. After nearly a decade of construction, work on this line was abandoned in 1861 due to the Civil War. Under new charters of incorporation from both the West Virginia and Virginia legislatures, work was resumed in 1868. The Virginia Central Railway was contracted in August 1868 to finish construction on the railroad, and changed its name to the Chesapeake and Ohio Railway (hereafter C&O) in November 1869. Construction continued and in June 1870, the C&O acquired control of the Blue Ridge Railroad, which had completed a line through the Blue Ridge mountains. Construction of the C&O road was begun in 1869, with construction from both the eastern and western terminuses. It was completed on January 29, 1873, when the final spike was driven at Hawk's Nest Bridge, West Virginia. The C&O's route followed the former right-of-way and proposed route of the James River and Kanawha Canal: over the Alleghanies, through the Greenbrier Valley, down the New River Gorge, along the Great Kanawha, and across Teay's Valley to the Ohio.[16]

The earliest settlers of the New River Gorge were aware of the abundance of coal, but had no way of transporting large quantities to market and therefore make a profit. The completion of the C&O Railway created a reason for the previously unexploited coal reserves of the New River Gorge to be mined. Indeed, the C&O offered the perfect transportation infrastructure to ship mined coal to both eastern Tidewater and western markets.

Nothing is more indicative of the impact that the completion of the C&O had than the immediate increase in West Virginia's total coal production for 1874. During the early 1870s state coal production averaged about 600,000 tons annually. However, in 1874 state production nearly doubled with an annual production of 1,120,000 tons. This huge jump in coal production was the direct result of the C&O Railway enabling the exploitation of the New River Field.

The New River Field

John Peter Salley is considered the first person to notice the presence of coal in what is now West Virginia. In 1742, Salley explored the New River region, naming and following the Coal River to its headwaters, noting the abundance of "coals."[17] Salley was not alone in noting the existence of "coals" in West Virginia, since the pioneer settlers who came to the New River Gorge were also well aware of the abundance of coal outcropping along the "Endless Wall" which rims the canyon. Coal was also abundant in the creek hollows of the tributaries of the New River. The coal outcropping in the gorge, the Sewell (named for Sewell Mountain where it was first found) or Nuttall (named for John Nuttall),[18] seam was high quality "smokeless" or "steam" coal, which burned very hot and emitted little smoke. Local settlers and blacksmiths made use of this coal, but extensive underground mining of the coal was not feasible since it offered little or no return on the time and money invested. Thus, not many mines were in operation in the gorge or Fayette County prior to the construction of the C&O. However, the quality of the coal was not going unnoticed.

During the early 1830s, the first scientific evaluations of Appalachian coal reserves were undertaken by Dr. Samuel Hildreth, a Ohioan, who published the results of his explorations in Siliman's Journal of Sciences. This work was followed up in 1836, with a four year study by William Baron Rodgers, at the time Virginia's leading geologist. He analyzed the coal from Fayette County and seven other counties, finding it of the highest quality.[19] It was at this time that the first mines began to open in the New River region.

The earliest mines to operate in Fayette County were Big and Little Sewell, first opened in the 1840s. These mines primarily furnished coal for the Kanawha Valley salt industry and domestic house fuel for Wheeling. During the 1850s, two new mines were opened in Fayette County under the 1854 Virginia act which allowed for the organization of companies for mining and manufacturing reasons (By 1860, there were 25 such companies with charters in western Virginia). The Crescent Coal Company and the Mount Carbon Mining Company were two companies chartered in 1857 for the purpose of mining coal. These two companies attempted to attract foreign investments, but the Civil War disrupted this effort to gain outside capital. Following the war, Fayette County entrepreneurs successfully began attracting overseas investors to develop the New River Field. In particular, British capital was invested at Hawks Nest when Londoner David T. Ansted and former Confederate Colonel John W. Imboden organized the Gauley-Kanawha Coal Company in 1873.[20]

The first mine to begin operations in the gorge following the

Civil War was opened by Colonel Joseph L. Beury, formerly of Schukill County, Pennsylvania, at Quinnimont on Laurel Creek in 1872.[21] Beury's operation, the New River Coal Company, was the first mine to ship coal on the newly completed C&O Railway in 1873. Buery went on to start more mines in Fayette County, including Fire Creek in 1876 and the Mill Creek Coal and Coke Company in 1884. Beury is considered the pioneer operator in the New River Field.[22] Other pioneering men would come to the New River gorge to open mines, including the Caperton's, Justus Collins, and Thomas McKell. These men are well known in the New River Field and rightly so, given the success of their mining operations. One man, however remains fairly anonymous, but had a huge impact on mining in the gorge. This man was John Nuttall.

Section 1.2 The Evolution of the Nuttallburg Mine Complex

John Nuttall (1817-1897)

Born in the city of Accrington, Lancashire County, England on April 9, 1817, John Nuttall was the fifth of six children historic photo 1). His father, Thomas, was a weaver. Nuttall following his father's footsteps, entered the textile trade at the age of eight as a tierboy[23] in a calico print works. At eleven, he entered the coal mines at Goodshaw, and when seventeen, he returned to the print works to become an apprentice. After three years, Nuttall tired of the textile industry and returned to the mines, where he worked for the next 12 years. John Nuttall emigrated to America in 1849, leaving his wife Elizabeth, and their three children, Alice Elizabeth, Suzanna, and Thomas behind in England.[24]

Nuttall arrived in New York City in May 1849. Before emigrating to America, he secured employment with Crabtree and Wilkerson, a silk mill on Staten Island. This mill was operated by his wife's brothers, Jonathan and William Crabtree. In 1850, Nuttall's wife and children emigrated to New York, joining him on Staten Island. Nuttall worked at the silk mill for seven years, where, according to family legend, he had earned enough money to pursue opening his own coal mine.[25]

In 1856, Nuttall learned of the Tyrone and Clearfield Railways (later the Tyrone and Clearfield Branch of the Pennsylvania Railroad) construction in central Pennsylvania in the four county area of Blair, Cambria, Centre, and Clearfield counties. The rail line was being constructed from Tyrone in Blair County through Philipsburg in Centre County and terminating at Clearfield in Clearfield County.[26] The purpose of this road was to exploit the timber and coal resources in the mountains along the railroad's route. Nuttall first investigated the proposed right-of-way, learning of a coal seam located on the Colburn Farmstead, about ten miles northeast of Tyrone. Satisfied with the quality of the coal from this seam[27], Nuttall convinced his brothers-in-law Jonathan and William Crabtree to finance his operation. They lent him enough money to acquire 200 acres of land and to fully equip his mine. Thoroughly funded, Nuttall then built Nuttallville, establishing a store and houses and equipping his mine with all the necessary timbers, mules, rails, and mine cars. Reportedly the Nuttallville Mine had the distinction of being the first mine to ship coal on the Tyrone and Clearfield line when it reached the village in 1862. Robert Powell purchased half interest in the mine in 1862 enabling Nuttall to increase the mine's production to 4,000 tons per month. Additionally, Nuttall earned a $0.05 per ton royalty on the coal mined at Nuttallville. Nuttall was very pleased with the royalty arrangement, and changed the village's

name from Nuttallville to Powelton. In 1866, Powell bought out Nuttall's interest in the mine, thereby gaining complete control of the mine.[28]

Nuttall reinvested the money from the Nuttallville Mine to establish a new mine on Coal Run near Osceola Mills, Clearfield County, Pennsylvania, located approximately five miles west of Powelton. He named the new mine Decatur because it was located in Decatur Township. This mine, however was not successful, failing because the coal seam would dip and disappear, requiring great expense and labor to relocate it. Undaunted, Nuttall established yet another mine in 1867 or 1868, this time in Clearfield County on a 1,200 acre tract along Moshannon Creek[29], across from Philipsburg. He named this new mine Decatur No. 1. Again, Nuttall established a village with a school and store. The village was officially named Decatur, but was known locally as Nuttall Blocks. This mine was very profitable, enabling Nuttall to invest in another mine. He named this mine Decatur No. 2. Buoyed with the success of these two mines, Nuttall established two more mines: Laurel Run No. 1 and No. 2.[30] Apparently, both of these mines were leaseholds with the mine properties owned by Richard Hughes and John Shaw.[31] This flurry of mining activity occurred in the space of about ten years, setting the stage for the development of a mine in the New River Gorge.

Nuttall's move to West Virginia to establish the Nuttallburg Mine opened the last chapter of his life. The next thirty years, clearly better than one-third of his life, would be spent in the New River Gorge. Whether it was the challenge of mining in the gorge or its rugged natural beauty, Nuttall finished his life there. John Nuttall passed away on September 15, 1897 and was buried in the Nuttall cemetery overlooking the mine he created.

Nuttall Family Era 1873-1900

In the spring of 1870, the 53 year old Nuttall reportedly read a newspaper account of the construction of the C&O Railway through the New River Gorge. Among the details in the article was information about the availability of coal along the route of railroad, particularly in Fayette and Kanawha counties. Nuttall was intrigued with the possibilities of opening yet another mine, this time in West Virginia. Leaving sons-in-law, George McGaffery and John Todd in charge of his Pennsylvania holdings, Nuttall traveled to eastern Virginia to begin a stagecoach journey west over the James River and Kanawha Turnpike bound for the Kanawha County coal fields.[32] After two days travel, he arrived at Cooper's Tavern at Locust Lane, Fayette County, near the headwaters of Keeney's Creek (probably in the Lookout vicinity). While lodging at the tavern, Nuttall observed coal being burned in a

fireplace. This surprised him. Nuttall examined a lump of the coal, noting its superior quality and inquired about the source of the coal. He was told it was mined from an outcropping along Keeney's Creek, a tributary of the New River. Nuttall had a chance meeting at the tavern with J.L. Blume, the local surveyor. Blume furnished Nuttall with information about the availability of local property and its costs. Blume also told Nuttall that there were three and one-half and four-foot seams of coal outcropping both at Keeney's Creek and at the cliffs below the rim of the gorge. Possessing this information, he decided to investigate the northern side of the New River Gorge.[33]

Nuttall's field investigations revealed a four-foot seam of coal located about 200 feet below the canyon rim in the sandstone cliffs along Short Creek, a tributary of the New River, located about one mile below Keeney's Creek. It was here that Nuttall decided he wanted to establish his mine.[34] To this end, Nuttall started purchasing property in Fayette County in November 1870, first acquiring 657 acres from R.M. Holliday. After this initial Fayette County land purchase, Nuttall returned to Pennsylvania with samples of coal, which he had analyzed at Philadelphia. These tests revealed the coal to be of a much higher quality than the coal being mined at his Pennsylvania mines.[35] Fully funded with Pennsylvania capital, Nuttall returned to Fayette County and over the course of December 1870, he purchased property along Keeney's Creek, the New River, and the cliffs of the New River. Much of this property was purchased from the Blume family, with other acreage purchased from the Alderson and Cavendish families.[36]

It is unclear where Nuttall lived during the next several years. Perhaps he traveled back to his Pennsylvania mines; perhaps he stayed in West Virginia, but clearly he made several more land acquisitions during the years 1870 to 1873. In late June 1873, Nuttall purchased three tracts of land "situated on the waters of the New River containing 600 acres..." from Jacob Blume for the sum of $6,600. The first tract, containing 179 acres, was located on the east and west sides of Short Creek. The second tract of 295 acres contained land from the New River to the canyon rim, while the third tract of 126 acres was located on Ferrin (Fern) Spring Run.[37] These three adjacent tracts were the core lands on which he established the village of Nuttallburg. With these acquisitions, Nuttall now had the necessary land, mineral rights and the transportation infrastructure to ship coal. However he still lacked a working mine.

Nuttall evidently began working on the mine site in 1870, bringing William H. Holland from his Pennsylvania mines as his mine boss. Spending the next 18 months, they readied the Keeney's Creek mine. But Nuttall still had to wait for the C&O railroad to be completed so the mine could be equipped with rails, monitor cars,

and other heavy equipment. This equipment could only be delivered by the C&O railroad due to the ruggedness of the terrain.

The Keeney's Creek mine was planned to have a production of 250 tons per day. Nuttall decided to open a second mine on Short Creek with a planned capacity of 500 tons per day. He named it the Nuttallburg Mine. The Keeney's Creek mine was ready to ship coal on the C&O when the line was completed in February 1873. This mine was the second New River mine to ship coal out of the gorge.[38] By late 1873 or early 1874, Nuttall had erected at the two mine sites 17 two-family dwellings, 80 one-family dwellings, acquired 220 mine cars, purchased 30 mine mules, built 80 coke ovens, and four 2-car monitors. Additionally, the Nuttallburg mine had a Scalehouse and scales, a Drumhouse or Headhouse, a Blacksmith Shop, a Carpenter Shop, Slate Dump, and a Tipple. (This Tipple's location must have been too far from the main stem, because at some point in the late 1870s, he built a new Tipple on the Nuttallburg siding adjacent to the C&O mainline.) The combined employment at the mine was 120 miners, 25 drivers, 40 trappers and bricklayers inside, 20 outside men, and 30 coke drawers.[39] Once Nuttall had finished the village and mine, he was ready to begin operations.

In 1882, the Nuttallburg Coal and Coke Company was formed, superseding the earlier Nuttallburg Coal Company. Nuttall had been buying Fayette County land on a regular basis, evidently purchasing any land offered him. These repeated land acquisitions must have left Nuttall land-rich and cash-poor, as he created the new company to generate money through both royalties and a leasehold to defray his debts. This new company was formed of an equal partnership of Jackson Taylor, company bookkeeper and husband of Martha Nuttall; William Holland, Nuttallburg's mine boss; Lawrence Nuttall, John Nuttall's son; and Nuttall himself. The company created a leasehold on the Nuttallburg and Keeney's Creek mine properties, with the lessee (apparently the other partners) paying the elder Nuttall royalties of $0.10 per ton of coal mined and an additional royalty of $0.02 per ton for the following twenty years to defray the costs of constructing the mine and village. However, Nuttall canceled the debt in 1894, believing he had received enough compensation for the debt.[40] By the mid-1890s, Nuttallburg was at the center of a tremendous amount of mining activity along Keeney's Creek, as it was a major C&O siding for coal mined up the Keeney's Creek hollow.

In the late 1880s, Nuttall found it advantageous to construct a branch line of the C&O up Keeney's Creek. This would serve two purposes: first, this branch line would better serve his existing mines at Nuttallburg and Keeney's Creek; and second, Nuttall believed that seven more mines could be opened in the Keeney's Creek hollow, if there was some way to transport the mined coal down to the C&O mainline. To this end, Nuttall surveyed the route

and he believed that such a road could be constructed. He approached the C&O Railway to build his branch line, but they claimed it could not be built since the hollow was to rugged and steep. Nuttall prevailed and the C&O engineers surveyed the route, concluding the branch line could indeed be built. Nuttall even offered to donate $100,000 towards constructing the line. However, A.A. Low of the Low Moor Iron Company of Low Moor, Virginia had recently purchased tracts of land on the south side of the gorge and wanted to exploit the coal reserves (the future Kaymoor Mines).

Low, a member of the C&O Board of Directors, wanted a second line to be built on the south side of the gorge. This was also agreeable to the C&O, since the north side tracks were often subjected to rock slides, which closed traffic on the mainline. Unfortunately, the C&O could not afford both expansions, electing to construct the second line on the south side of the gorge. Disappointed but undaunted, Nuttall offered to pay for the entire branch line's construction up Keeney's Creek and the C&O ownership accepted the offer. They also agreed to maintain the branch line, and gave Nuttall's anticipated mines free freight on board for coal conveyed.[41] In June 1891, the C&O was contracted to construct the branch line from Nuttall Station to the headwaters of Keeney's Creek near Lookout. In 1893, the line was completed five miles to the mines at Rothwell, and in 1903 the line was completed the last two miles to Lookout. The Keeney's Creek Branch of the C&O Railroad had a length of 7.8 miles with two switchbacks and five trestles overcoming 1,206 feet in elevation.[42] The construction of the Keeney's Creek Branch typifies the kind of engineering accomplishments performed in the New River Gorge, both in railroading and mining, where unique solutions were required to overcome the terrain and change in elevation.

Despite Nuttall's promises to underwrite the Keeney's Creek Branch's construction, he was unable to completely finance it (it would have bankrupted him), and consequently he was unable to open the new mines he had envisioned. Apparently there were no lack of coal operators who had the necessary capital to open the proposed Keeney's Creek mines. Instead, Nuttall offered first-choice leaseholds to his employees and friends. William Holland and Fred Rothwell purchased leaseholds and established mines along the branch lines route in anticipation of the railroad. They agreed to pay Nuttall a $0.10 per ton royalty on the coal mined and pay him $0.05 per ton shipping fee for transporting the coal down Keeney's Creek. The sale of these leases helped to finance the branch line.[43] Other capitalists were granted second-choice leaseholds and also opened mines along the branch's right-of-way. The mines opened by Holland, Rothwell and the others would form the future holdings of the Maryland New River Coal Company.

An Era of Change: 1900-1920

Mining activity in the New River Gorge was increasing at the turn of the century. New mines like the Low Moor Iron Company's Kaymoor Mines, were opened to meet the demands of American industry. Additionally, society was changing with the advent of inventions such as the automobile, the airplane, the incandescent light bulb, the telephone, and a host of other inventions that affected everyday life.

The corporate world was also in a state of flux with the advent of "Big Business". That is, the rise of controlling and acquisition of raw materials, resources, and services required in manufacturing processes, resulting in control over the market price of finished products. For example, Andrew Carnegie bought steel mills and bridge fabricating companies, consolidating them under one management system that formed corporations such as the United States Steel Corporation and the American Bridge Company, or the Pennsylvania Railroad's acquisition of controlling interest in many eastern railroads.

The New River Gorge was still isolated at the turn of the century. However, the rapidly-changing world impacted mine management practices in the gorge. These changes were also felt at Nuttallburg. In June 1903, the Nuttallburg Coal and Coke Company, (a partnership of Lawrence Nuttall, G.W. McGaffey, Jackson Taylor, Martha Taylor, E.A. McGaffey, K.D. Nuttall, and Suzanna Todd), was deeded to the "Nuttallburg Coal and Coke Company, a corporation..." for the sum of $100,000. All property, equipment, and goods were situated at the Keeney's Creek and Nuttallburg mines. (For the complete description of property deeded, see appendix I.) Additionally, the Nuttallburg Coal and Coke Company,

> ...the said lessors do hereby demise, let and lease for coal mining and coke manufacturing purposes to the said lessee, the exclusive right and privilege to mine and carry away all the coal in and from the seams within, under and upon the lands and premises hereafter described, to manufacture and sell coke thereon and there from for such period of time as may be necessary, with the exercise of reasonable diligence, to remove all workable coal from the following boundary of land situate in the Nuttall District in Fayette County, West Virginia...containing 4,160 acres.[44]

In addition to the above rights, the lease also contained covenants which granted timber, water, stone and other surface rights to the lessee for $6,000 per year per vein of coal mined. Apparently the Nuttallburg Coal and Coke Company was incorporated as part of the settlement of John Nuttall's estate. This company operated until 1908.

In October 1908, the Nuttallburg Coal and Coke Company leasehold was sold and the company's name changed to the Nuttallburg Collieries Company. This name change reflects the trend of other coal companies in the New River Gorge, such as the Collins Colliery Company headquartered at Glen Jean. The leasehold was sold for the sum of $178,000.[45] The success of this venture was limited at best. From 1908 to 1909 the mine's annual production increased and more miners were hired, but from 1909 to 1912 the mine's annual production declined and then leveled off (See Appendix II). Ironically, Fayette County's annual production increased over the same period, implying that the Nuttallburg Mine was not very productive or, perhaps more importantly, not very profitable. The lack of the mine's profitability was confirmed in March 1912, when the Nuttallburg Collieries Company was adjudged bankrupt by the District Court of the United States for the Southern District of West Virginia located at Charleston. The court assigned the Kanawha Banking and Trust Company as the trustee for the Nuttallburg Collieries Company, and it was sold at public auction April 1912 to William E. Deegans[46] for the sum of $138,000. Assets included all of the mining equipment, office furnishings, conveying equipment and processing equipment, as well as the leasehold.[47] The sale resulted in the formation of the Nuttallburg Smokeless Fuel Company, which was chartered by Deegans and other entrepreneurs with a stock capitalization of $125,000.[48] Again, this new company's name, "smokeless," reflected the general trend of coal companies operating in the gorge at this time. The New River Smokeless Coal Company and the Smokeless Coal Company had corporate names which clearly reflected the type of coal they mined and marketed; coal that burned at a very high temperature and emitted very little smoke.

The success of the Nuttallburg Smokeless Fuel Company is difficult to measure, as annual production fluctuated from 40,190 tons in 1914 to 59,375 tons in 1916, and back down to 47,593 tons in 1918 (See Appendix II). Apparently, no new technological improvements were introduced at the Nuttallburg Mine, although the company increased the number of mining machines from two machines to five machines in 1913, and six machines in 1915. The Nuttallburg Smokeless Fuel Company was acquired by the Ford Motor Company's coal interests during the summer of 1920.[49] The acquisition of the mine by Henry Ford ushered in a new era, wrought by changes and improvements in the technology employed at the Nuttallburg Mine.

Ford Era: 1920-1928

The 1920s were an era of expansion for the Ford empire. Vertical integration was Ford's ultimate goal, as he attempted to gain control of not only coal mines, but over transportation as

well. In the years following World War I, Ford acquired control of the Detroit, Toledo and Ironton Railroad. He extended the line from Detroit to his River Rouge, Michigan plant, ultimately planning to extend it from Ironton, Ohio, into the Kentucky and West Virginia coal fields. Ford built the lake freighters "Henry Ford II" and "Benson Ford" to ship ore on the Great Lakes; these freighters could dock at the River Rouge Automobile Plant with its mile-long dock frontage.[50] Henry Ford's hallmark during the 1920s, was gaining control over raw materials and transportation facilities, and improvement of production and productivity at his mines and plants.

The Nuttallburg Smokeless Fuel Company was purchased by Henry Ford's coal interests in 1920. Ford acquired the mine because he wanted a captive mine to supply high-quality steam coal for his River Rouge Automobile Plant. This plant was completely integrated with blast furnaces, coke ovens, a foundry, machine shops, a glass works, and many other shops related to the manufacture of parts and materials used in the assembly of automobiles.[51]

Ford not only wanted to control the market price of coal used by River Rouge and his other subsidiaries; he also wanted to circumvent the stockpiling of steam coal by the United States Navy (the US Navy favored New River coal because of its smokeless characteristics), the prevailing problem facing the major consumers of coal following the First World War. It was to this end that the Ford coal interests purchased the Nuttallburg Mine leasehold and approximately 4,000 acres of coal reserves in the summer of 1920. Ford had been interested in buying coal properties for several years. Reportedly he purchased tracts at Marmet in Kanawha County in 1918.[52] Ultimately, Ford purchased mine properties in both Kentucky and West Virginia, including the Twin Branch properties in the Pocahontas Field and the Pond Creek properties in the Tug Fork District. Ford's purchase of the Nuttallburg Mine began a bizarre series of events and business decisions relating to the mine site.

Henry Ford, a former mechanic, visited the Nuttallburg Mine in October 1921, wanting to inspect its operations firsthand. He arrived at Nuttallburg in a private railroad coach which was placed on the Nuttallburg siding. Ford then toured the mine, crawling on his hands and knees to reach the workings, and offered suggestions to the miners on improvements. Ford was always interested in his employees welfare and he took this opportunity to gain firsthand knowledge by visiting their homes and schools.[53]

The Fayette Tribune account of Ford's visit notes that the Nuttallburg Mine was mostly abandoned due to the expense of extracting the coal. And indeed, after his visit, Ford closed the mine from October 1921 to November 1922.[54] Why did Ford close the mine? Reportedly Ford felt the mine was not very profitable in

relation to the cost per ton of Nuttallburg coal and the market price of coal. Perhaps he wanted to curtail any union activities at the mine by closing it and then being able hire non-union miners at his own wage scale when he reopened the mine. More fundamentally why, then, did Ford buy this particular mine? There is no record what the Ford coal interests paid for Nuttallburg, but it probably did not command a very high price. So the answer may well be that Ford thought he could modernize the mine to a point that it could be made productive, since it cost so little. But, Ford's actions relating to his decisions to improve the mine were - circuitous at best. This is demonstrated by the following account of the events surrounding his decision to infuse a large amount of money into the mining operation.

In October 1922, Coal Age, an industry trade journal, reported that Ford had closed down and was dismantling the Nuttallburg Mine site.[55] This may have been the result of his trip to the mine the previous year. Furthermore, in early November 1922, Coal Age reported that Ford was willing to sell the mine to the Maryland New River Coal Company, the owner's of all the mines adjacent to the Nuttallburg Mine along Keeney's Creek. This sale was never transacted.[56] However, in late November the events took a bizarre turn when Coal Age reported that a temporary injunction had been granted against the Maryland New River Coal Company, preventing them from removing certain mine barriers which separated the Keeney's Creek Mine from the Nuttallburg Mine. Apparently Maryland New River wanted to drain the Keeney's Creek Mine by flooding the Nuttallburg Mine.[57] By the end of December 1922, Ford had completely changed his mind about the mine, deciding to resume operations at the Nuttallburg Mine. This change of heart would soon result in a series of capital improvements at the mine, evidently directed at improving production and profitability.[58] Apparently, Ford's motivation to close the Nuttallburg Mine was rooted in his recent acquisition of the Dexter-Carter Pocahontas Coal Company property at Twin Branch, West Virginia in October 1922 and in his belief that the Nuttallburg Mine was not able to compete with the other mines in the New River Field (in terms of the net cost of per ton).[59] In the course of two months, Ford had changed his plans for Nuttallburg completely, and in 1923 he would initiate new development plans.

The new year of 1923 brought many new plans for improving the Nuttallburg Mine. These improvements were geared to increasing Nuttallburg's output and thereby making the mine more competitive with the other mines in the New River Field. There were many changes forthcoming, starting from the top down with a major corporate realignment. This corporate realignment made a big splash, and was featured on the front page of February 10, 1923 The New York Times. Indeed, Ford's foray into mining was closely followed by the media with extensive coverage in newspapers and

industry trade journals.

The creation of the Fordson Coal Company in February 1923 consolidated all of his coal interests in West Virginia and Kentucky under one managerial umbrella. Ford's son, Edsel headed this new corporation, hence the name Fordson (Edsel Ford also headed the Fordson Tractor Company). Headquartered at Stone, Pike County, Kentucky, the Fordson Coal Company was incorporated at Dover, Delaware and was capitalized with $15,000,000 worth of stock. Ford, believing that the market price of coal was artificially set by the operators, planned to sell any excess Fordson coal on the open market at a price that would undercut the prevailing market price (Ford never did offer coal on the market or sell it at a below market price).[60] Shortly after the formation of the Fordson Coal Company, the capital improvement plan was initiated for the Nuttallburg Mine.

The first of the renovations at Nuttallburg was the awarding of a contract for the construction of several hundred new mine cars. The contract was let to the Cumberland Iron Works of Huntington, West Virginia in February 1923. Coal Age reports that at Nuttallburg "...new machinery is being installed throughout."[61] In this brief notice was the first harbinger of the improvements yet to come at Nuttallburg.

In November 1923, the Fordson Coal Company announced that a contract had been let to the Roberts and Schaefer Company of Chicago, Illinois, for the construction of a new steel Tipple at Nuttallburg.[62] The equipment contracted for installation featured "Marcus" Screens and RandS Shaker Type Loading Booms. The "Marcus" Screens were a German design for horizontal vibrating screens, and Roberts and Schaefer held the American patent rights for its design and manufacture. The RandS Shaker Type Loading Booms were a combination shaker screen and loading boom which sorted the coal and loaded it in a combined process.[63] The new Tipple at Nuttallburg was the first of several Fordson contracts let during 1924 to Roberts and Schaefer for new tipple construction (an additional six new steel tipples were contracted for construction at the Twin Branch and Pond Creek properties).[64] The Nuttallburg Tipple contract was let in the late fall of 1923, and presumably it was completed by late 1924. This new Tipple was used in conjunction with the existing Monitor Car System and Headhouse installed by Nuttall for another year until Fordson decided to upgrade the old Monitor and Headhouse with new equipment.

Fordson announced in November 1925 that it had contracted with Fairmont Mining Machinery Company of Fairmont, West Virginia for the construction of a Retarding or "Button and Rope" Conveyor and a new steel Headhouse. The Headhouse contract was let for $55,000, with a completion date set for March 1, 1926.[65] However, this

completion date was not met because it was announced the mine would suspend operations in mid-April 1926 to finish installing the Conveyor. After further delays it was announced at the end of April that the Conveyor installation would be completed within six weeks. The 1,385 foot conveyor, one of the longest ever installed, was reported to have cost $100,000, a healthy sum of money for the pre-depression years.[66] Other new equipment to be installed included an automatic car stop and feeder for the crossover dump at the Headhouse and a synchronous-convertor Substation. The Substation was constructed on the bench level adjacent to the mine opening and was used to convert commercial high voltage current to a lower voltage current used to operate mine equipment.[67] Early in the summer of 1926 the installation of the Headhouse and Conveyor was completed with operations resuming thereafter at Nuttallburg. This construction was a turnkey operation and its completion marked the end of the Fordson Coal Company's improvements at the Nuttallburg Mine.

In the final analysis, Fordson spent close to $300,000 on these improvements and production increased twofold, but Henry Ford never really considered this mine to be very competitive or profitable when compared with other New River mines such as Kaymoor (in general, Kaymoor outproduced Nuttallburg three to one) or his other mine operations. (See Appendix III for a comparison of Nuttallburg and Twin Branch's production.) The Fordson Coal Company sold the mine to the Maryland New River Coal Company in the summer of 1928. The sale of the Nuttallburg Mine marks the end of Ford's period of experimentation with the mine, as he was never able to precisely decide the mine's role in his vast industrial empire.

Maryland New River Era: 1928-1953

The Maryland New River Coal Company purchased the Nuttallburg Mine leasehold in July 1928 for the sum of $5.00 and "other special considerations." The Fordson Coal Company divested itself all of its holdings at the Nuttallburg and this included "all livestock, equipment, plant, machinery, and all other personal property...Situated on said real estate or leased premises...used in connection with their mining operations..." Additionally, Maryland New River assumed all of the contracts let by the Fordson Coal Company between the C&O and other companies.[68]

The Maryland New River Coal Company, headquartered in Philadelphia, Pennsylvania, advertised their coal as "Dubree" New River Smokeless Coal. Maryland New River used the Maryland Coal and Coke Company as their "exclusive selling agents."[69] Maryland New River made available all grades of coal including lump, egg, stove, pea, nut, slack, and run of mine.[70] Presumably Nuttallburg

coal was sold for coke making, power plants and other industrial uses; and small scale operations such smithing and remelting pig iron and other metals at foundries for castings.

In 1928, the Maryland New River Coal Company renamed the Nuttallburg Mine "Dubree No. 4." It became the sibling mine to Maryland New River's four other mines renamed that year: Dubree No. 1, 2, 3, and later 5, which were formerly known as (no order) Boone, Rosedale, Smokeless, and Dubree. These mines were located along Keeney's Creek near the village of Winona, and were established along Keeney's Creek following construction of the Keeney's Creek Branch in the 1890s, many by Nuttall's lessee's. Two of the first properties acquired by Maryland New River in 1917 were the Boone and Smokeless mines owned by the Keeney's Creek Collieries.[71] The other mines, Rosedale and Dubree, were acquired prior to 1922.[72] Collectively, these mines were ones opened by Nuttall's friends and employees following the construction of the Keeney's Creek Branch.

Through the years, Dubree No. 4's output fluctuated, sometimes leading, sometimes equalling and sometimes producing less than the other Maryland New River mines due to changes in the market, the Great Depression, and World War II (See Appendix II). Interestingly, Nuttallburg's coal production peaked in 1929, the first full year of Maryland New River ownership with 171,125 tons being produced. In general, coal production at Dubree No. 4 increased under Maryland New River management. This can be accounted for in two ways: the advent of mechanized coal production, and the opening of new mine portals to the west along the bench. It is unclear just how many portals were used by the various Nuttallburg companies prior to this expansion, but field observations suggest that minimally five new mine openings were opened at the site. These openings were probably driven in search of a thicker seam, as well as to increase output.

In 1952, Maryland New River modified the Tipple, adding a Belknap Chloride Washer (used to wash the coal and make it more marketable) and presumably removing the original Marcus screens. Additionally, new timber construction was added on the downstream end to house and support the Belknap Washer. This equipment may have been installed by the Kanawha Manufacturing Company, Charleston, West Virginia, but this is only speculative.

Garnet Coal Company Era: 1954-58

Dubree No. 4 remained operated by the Maryland New River Coal Company until 1953 when it was closed. In 1954 the mine was leased to the Margie Coal Company of Beckley, West Virginia. Apparently Margie Coal mined little or no coal and the mine was leased later

that year to the Garnet Coal Company.[73] During Garnet's first year of production, the mine produced 25,469 tons, but output fell to a record low in 1958, with 4,702 tons being mined. (See Appendix II) Falling production coupled with a record low number of miners employed, (See Appendix V) apparently forced the closure of the mine in 1958.

Garnet Coal may have operated the mine as a "dog hole" or "gang" mine that employed local miners to extract coal. These mining activities probably resulted in the pulling of pillars left to support the mine roof, a very dangerous activity which left the mine roof in a unstable condition. However, the robbing of pillars was very common in old mines that had been worked out. It is unknown how this coal was taken to market and to what market this coal was shipped. Perhaps the conveyor was still operating, or trucks or wagons were brought onto the bench to convey the coal away. The market may well have been for local use as house coal.

The Town of Nuttallburg

John Nuttall founded the village of Nuttallburg in 1873-74. John Nuttall's grandson, John Nuttall II, writes in Trees Above with Coal Below that his grandfather constructed upwards of 110 dwellings for his miners at the Nuttallburg and Keeney's Creek mines. Given that the Keeney's Creek mine was a smaller operation, it follows that the majority of these 110 dwellings, probably 75 to 85 houses were constructed at Nuttallburg. The 1883 West Virginia mine report notes that 81 miners, track layers, drivers, outside men and others were employed at the mine.[74] The majority of these workers and their families would have lived at the village of Nuttallburg. The Nuttallburg post office was established in 1893.[75]

Incidentally, the United States Post Office cited the town as Nuttallburg, but the C&O manifests listed the town as Nuttall or Nuttall Station. Nuttallburg workers not only lived in the gorge, but also on the canyon rim. The canyon rim settlement was known as Nuttall Mountain until a post office was established there and the town was renamed Edmund, for Eddie Ryan, son of John Ryan, the man responsible for establishing the post office.[76]

The village of Nuttallburg grew into a town as the mine prospered and more dwellings were constructed, some more substantial than others. A 1903 inventory of the Nuttallburg Mine property (see Appendix I) shows a total of 75 dwellings (single and double), including the residences of the mine boss and doctor in Nuttallburg. The inventory also lists three homes on the canyon rim. Other structures are related to the operation of the mine, such as a Powder House, Store House, Tipple, Headhouse and so forth

are also inventoried.[77] Undoubtedly, by the turn of the century, Nuttallburg was a flourishing New River community.

A Maryland New River Coal Company map of Nuttallburg dated July 10, 1922, shows a total of 73 numbered houses at Nuttallburg bottom.[78] The town of Nuttallburg was segregated with two Baptist churches with separate white and black congregations, separate black and white schools, and segregated club houses. Other buildings at Nuttallburg included the C&O Depot ~~(see historic photo 26)~~, a Powder House, Powerhouse, Barns, and Company Store. Additionally, the town had a fire hydrant system with a water tank to supply water to fight fires. The Nuttall family had a house at Nuttallburg, as did the Taylor and Holland families, two of the other prominent families associated with the founding and operating of the mine. Naturally, these buildings were commanding structures which dominated the diminutive miners' homes at Nuttallburg.

A typical miner's house at Nuttallburg was a one-story, four room structure, with a kitchen, dining room, and two bedrooms. Other houses were two-storied, with three rooms downstairs and two rooms up (presumably with a kitchen, dining area, and bedroom on the first floor, with two bedrooms on the second floor). These houses were very cheap and roughly constructed with very few amenities, which was characteristic of company housing of the period. Many of the inhabitants had gardens behind their homes, growing beans, onions, and other vegetables, while other Nuttallburgers kept pigs and other animals. During the Ford era, no new houses were constructed, but Ford spruced up Nuttallburg housing with new paint and even whitewashed the rocks. Apparently, Ford also built a wooden garage at Nuttallburg for employees with automobiles.[79]

The miners and their families who lived at Nuttallburg were ordinary people, mostly of English and Afro-American descent. There was segregation in the mines with blacks and whites working in the same section with blacks having a lower level of responsibility. Additionally, the religious, social, and educational institutions were also segregated. The miners work schedule varied in the early part of the twentieth century due to car shortages. Miners often worked only four or five days a week. This changed in the 1930s when mechanization began to structure the miner's job into a six-day week with Sundays off.

The secluded nature of the New River Gorge precluded many of the social and cultural events which we take for granted today. There was a baseball field in Nuttallburg and club houses for socializing, but little else. However, the C&O offered excursions to Cincinnati and other cities for baseball games and other cultural events. Since Nuttallburg was a company town, there were no bars or taverns, but the local inhabitants gambled, made

moonshine in the cliffs above the town, and brewed their own beer as part of their recreational activities.

The town of Nuttallburg slowly declined following World War II. The mine was almost worked out, as was the New River Field. Young people no longer wanted to stay in the rural isolated setting of the New River Gorge, desiring instead to move to urban areas in search of work and a better life. By the mid 1950s, the post office for Dubree No. 4 moved to Winona and the town was slowly being abandoned. The Nuttall Depot was retired in 1962 by the C&O. Once the mine closed for good, the town of Nuttallburg virtually became a ghost town, with the wooden dwellings moldering back to nature. Today, only the steel Headhouse, Conveyor, Tipple, and a few structures made of stone or concrete remain in mute testimony to the once thriving New River Gorge community.

Part II: The Technology of the Nuttallburg Mine Complex

Section 2.1 Introduction

The following sections address the technology employed at Nuttallburg Mine Complex that was employed to extract, convey and process coal. In particular, this part of the narrative focuses on the specific types of technology utilized both underground and aboveground at Nuttallburg and how this technology changed over the course of the mine's operations. A thematic approach has been taken here, beginning underground, discussing the extraction of coal, and progressing as the coal did from the Headhouse down to the Tipple, with discussions about Refuse and Coking. These discussions center on the evolution of mining technology at the site. The additional sections that follow address other important aspects of the mine site including above and below ground transportation, and other topics. A thematic approach was used so that any aspect of the mines operation could be examined individually without necessarily reading the entire narrative or taken as a whole.

At the beginning of each section is an introductory passage intended to give a general overview and descriptive explanation of the process, type of equipment, or structure being discussed. This is intended again to help familiarize the reader with the general functions of coal mining technology.

The following general discussion is intended to introduce the reader to the overall movement of coal at the Nuttallburg Mine Complex. This discussion should be kept in the reader's mind while reading Part II of the narrative.

The coal was first mined and then loaded into mine cars. The loaded mine cars were gathered in the mine and hauled to the Headhouse. Here, they were first weighed and then the coal was dumped into a hopper which fed onto the Retarding Conveyor. The Conveyor then transported the coal down the gorge to the Tipple. At the Tipple the coal was processed by sorting the coal into the various sizes and grades. Once sized, the coal was loaded into waiting hopper cars on the railroad tracks beneath the Tipple or transported to the coke ovens for coking.

One last important item: when the Fordson Coal Company's program for modernizing the mine was completed in 1926, virtually all vestiges of the original Nuttall constructed equipment and structures were removed.

Section 2.2 Extracting, Conveying, and Processing Coal

Underground Mining

In coal mining operations, there are four entry methods to gain access to coal seams: strip mining, deep or shaft mining; slope mining; and drift mining, (see illustration 1). In strip mining the overburden or earth is removed by bulldozer, or other earthmoving equipment to reveal the coal seam. The coal is then extracted by blasting, conveyed to the preparation plant for processing, and shipped to market. In shaft mining, the mine entry is driven from the surface vertically to the coal seam. The coal is mined deep within the ground using conventional mining methods, and is brought to the surface for processing. The slope mine is a combination of both shaft and drift mining, with the mine opening being driven from the surface at an angle deep into the earth to the coal seam. In drift mining, coal seams outcrop and the mine is opened by driving into the coal seam. Coal is continuously mined or "won," following the seam as it dips or climbs or disappears. The method of extraction employed at Nuttallburg was drift mining, as were the majority of the mines in the New River Field. Deep, slope and drift mining all utilize the room (or bord) and pillar system of mineral extraction. In general, room and pillar mining removes large rooms of coal leaving individual pillars of coal to support the roof. This was the method of mining at Nuttallburg. (see illustration 2).

Mining operations at Nuttallburg were begun with parallel entries or galleries, driven 30 feet apart into the coal outcroppings along the bench level. One entry was for movement of men and coal, while the other served as an air course for ventilation. At intervals of 100 feet, breakthroughs were cut to allow for air circulation (See Fan House and Ventilation). Every third breakthrough was to have been cut on a diagonal to allow for the laying of track and the removal of the mined coal. This procedure, however, was not strictly adhered to at the Nuttallburg Mine. The previous breaks were walled-in to maintain and control proper ventilation within the mine. Ventilation was controlled by doors in the walls of the breaks, that were opened and closed to regulate air flow. At intervals of approximately 600 feet, side or butt entries were driven off at right angles and extended to the property lines of the mine. Once two parallel side entries were driven, rooms were assigned at approximately 30-foot intervals. Two miners were assigned to mine each room. The rooms were mined from both ends, meeting somewhere in the middle. The farthest rooms of the works were mined first, so that the pillars could be extracted and the roof permitted to settle. This was repeated, with rooms being mined and successively worked towards the main gallery.[80] The physical extraction of the coal from the rooms was accomplished using a system known as "pick mining."

Pick mining was the earliest system of mining employed at the Nuttallburg Mine. (see illustration 3). This system involved a series of tasks before the coal could be extracted. The pick miner first undercut the face of the coal using a pick, creating a wedge-shaped cut. This task took from two and one-half to three hours to execute. Once this chore was accomplished, the miner used a breast auger (like a large carpenter's brace and bit) to bore three holes in the coal face. These holes had an upward slope or cant which was the mirror image, or opposite angle, of the undercutting. The placement of these holes was critical to how the coal was blown down. If these holes were not precisely located all of the coal would not be dislodged from the face; equally unsatisfactory was the potential for the coal to disintegrate and not fall in lumps. The determination of where these holes were drilled was based largely on the miner's experience. The greater the miner's experience, the greater the probability that the blasted coal would fall in lumps. Following the drilling of these holes, the holes were charged with black powder (later, safer powders known as "permissible" powders were developed and were much less volatile than black powder, and less likely to explode in the charging process) and the "miner's needle," an iron rod five to six feet long, was inserted into the charged hole. The powder was tamped down with "dummy," a layer of dirt or clay and the tamping rod or "miner's needle," was slowly withdrawn, leaving a hole for the insertion of the fuse, or "squib." The fuse, made of wax paper and black powder, was then lit and the coal blown down.

The next phase in the pick mining process was the firing of the charges. This usually occurred just before supper, with the miner retiring into a side entry to eat his dinner. The dinner break served another purpose: it allowed the galleries and rooms to clear of smoke. After the dinner break, the miner would return to his room and begin to shovel or hand load the "blown down" coal into waiting cars. The tonnage of coal that he and his helper shoveled into the coal cars determined the miner's daily wage. Essentially, the more coal shoveled, the more wages earned. When the miner had loaded all the coal and cleaned up his room, he was free to leave the mine. This was known as the "miner's freedom."[81] However, miners were also responsible for other duties, including setting roof timbers, laying track, and cleaning coal of slate and other refuse. Often these were duties without pay and were considered as "dead time." These were the normal activities of a pick miner until the advent of mechanized coal mining in the late nineteenth and early twentieth centuries.

The development of electric and pneumatic mining machines is considered the birth of mechanized mining. These machines replaced the tedious task of hand undercutting the coal face, with machines that essentially replicated the process used by the miner to undercut the coal. These machines were first developed and tested

during the 1870s and one of the earliest developed was the Jeffrey machine. Other manufacturers, such as Morgan-Gardner Electric Company, The Goodman Manufacturing Company and Sullivan Machinery Company also manufactured coal undercutting machinery. The Jeffrey machine featured a cutting bar with an endless chain, much like the cutting bar of a modern chain saw, which moved parallel to the face and undercut the coal. The coal, however, still required blowing down and loading.[82]

The first mining machines were introduced to the Nuttallburg Mine in late 1900 or early 1901, when two Jeffrey Shortwall Coal Cutters were brought on line in the mine (see illustration 4).[83] This was the first attempt to mechanize the Nuttallburg Mine, however, not until the Ford era would the mine become more reliant on mechanized coal mining. It should be noted that the early mechanization of coal mining was resisted by many miners (not necessarily at Nuttallburg, or by every miner), who sometimes destroyed mining machinery, much like the Luddites of Great Britain who sabotaged labor saving devices. Many miners resisted the advent of mechanization, because these labor saving devices cost jobs and it undermined the traditional right of the miner's freedom. Despite this resistance to mechanization, the establishment and widespread use of mining machines was widely adopted by the coal mining industry.[84]

The advent of mining machine technology at Nuttallburg was a watershed occurrence, marking the change from traditional pick mining to the new increased production methods of machine mining. (See Appendix VI for a comparison of pick and machine production) The use of this technology, however, was very slow to take hold at Nuttallburg, as indicated by production figures for the period of 1900 to 1910. Production from the mining machines was low, rarely exceeding 50 per cent of the total production in the period. For example, in 1901, 64,126 tons of coal were mined at Nuttallburg, with 57,784 tons pick mined and 6,341 tons machine mined. Similarly, in 1907, only 14,511 tons of the total tonnage of 41,894 tons was machine mined. After 1910, the majority of the coal won at Nuttallburg was machine mined. For example, in 1913, a peak year for machine mining prior to the Ford era, 46,828 tons of coal were mined, as compared to 13,589 tons using the traditional pick mining method. This increase in coal production was directly related to the fact, that over time, more mining machines were brought on line and by 1915, a total of six mining machines were in use at the mine. In 1920, the year Ford bought the mine, the total coal production of 26,833 tons and was entirely machine mined.[85] Production was down for 1920, but the Ford era was just beginning and new production records were forthcoming.

The Ford era ushered in a new program of modernization at the Nuttallburg Mine. One of the earliest and most fundamental changes

to occur at the mine was the abolishment of pick mining. As stated above, the 1920 West Virginia Department of Mines report indicates Nuttallburg's production totaled 26,833 tons.[86] The coal production for 1921, doubled, yielding 50,932 tons, using four mining machines and no pick miners.[87] Interestingly, pick mining at Nuttallburg was resumed in 1925 and continued during the remaining period that the Fordson Coal Company operated the mine. Presumably, Ford wanted to increase production by pulling pillars and used pick miners to this end. However, production using pick miners never competed with production using mechanized methods. For example, in 1926, a total of 175,443 tons were mined with 43,860 tons of the total pick mined, approximately 25 percent of the total production.

The Fordson Coal Company sold the Nuttallburg Mine leasehold in 1928 to the Maryland New River Coal Company. Maryland New River renamed the mine Dubree No. 4 in 1928. Coal was still mined using both machines and the traditional pick method, but pick production, like the Ford era, was very low as compared to mechanized coal production. For example, Dubree No. 4 production for 1930 totaled 163,284 tons, but only 1,821 tons were extracted with the pick method.[88] The amount of coal won at Dubree No. 4 using traditional methods continued to decline during the 1930s.

It was during the Maryland New River era that unionization came to the mine and to the New River Field. The unionization of the New River Field strongly influenced the mechanization of the Nuttallburg Mine.

The United Mine Workers of America (UMWA) organized the Nuttallburg Mine about 1917, but the local failed shortly thereafter.[89] Further union activities at Nuttallburg were shut-out as everywhere else in the state in the 1920s. This was the status quo until the spring of 1933, when Congress enacted the National Industrial Recovery Act (NIRA) and legitimized the UMWA right to organize the coal fields. Specifically, the NIRA's intention was

> ...the removal of obstruction to the full and free flow of interstate commerce, promotion of welfare through organization of industry under adequate government supervision, promotion of there fullest use of production capacity through increased buying power, reduction of unemployment, improvement of labor standards, and the conservation of natural resources.[90]

The establishment of the NIRA spelled the end to a laissez-faire system of management, giving the federal government power to intervene in the affairs of the coal companies, and the rights of collective bargaining and organization were stipulated under section 7a. As a result of this new legislation, the UMWA was able

to organize the coal fields of West Virginia, and thus the Nuttallburg Mine was organized in 1933.[91]

The use of pick mining at Nuttallburg ceased during the mid 1930s. The legitimization of unions under the National Industrial Recovery Act (and the later Wagner Act) and the subsequent widespread adoption of mechanization by the coal companies were final death knells for pick mining. There was a trade-off between the coal companies and the United Mine Workers of America in that the union had the right to organize the coal fields, and the companies had the right to fully mechanize the mines. New technologies were then freely introduced to the coal fields, particularly relating to coal loading.[92]

Maryland New River in the late 1930s adopted the use of conveyors to expedite loading.[93] Physical evidence at the mine site suggests that a Joy "15-CC" Portable Conveyor (also called a "pan" conveyor) was used in the mine. By adding or removing sections, the conveyor was capable of being lengthened or shortened to meet the needs of a particular room.[94] Coal shoveled into the conveyor trough at the face, was conveyed or dragged by an endless chain fitted with flights and discharged at the head end into waiting cars.[95] Even though coal loading became mechanized at Nuttallburg, the majority the coal mined, was still loaded using hand methods.

In 1936, the first year the West Virginia mine report notes the use of conveyors, only 11,233 tons of the total production of 128,954 tons mined were hand loaded onto the conveyor at Dubree No. 4. The number of tons loaded onto the conveyors and the number of conveyors fluctuated over the next 15 years but gradually increased until 1952, when 44,729 tons of the 75,631 tons produced were conveyor loaded. In 1950, the state mine report indicates the use of eight conveyors underground at Dubree No. 4. Production increased in 1952 as compared to the previous years, and this reflects the increased use of mechanization at the mine. Maryland New River ceased operations in 1953.

In 1954, the mine was first leased to the Margie Coal Company and later that year to the Garnet Coal Company, but apparently neither did anything to improve or modernize the mine (and coal mined was probably in the form of pillar robbing). The Nuttallburg Mine was in its august years, and the increased use of technology reflects the attempt to keep the mine competitive with other mines in the New River Field and the state on a whole. However it was a case of too little, too late, because the mine went out of production in 1958.

Headhouses, and Monitor and Conveyor Systems

Mining in the New River Gorge presented special problems in designing and engineering mine structures because of the distance of the mine from the railroad. Generally mines in the gorge employed two principal mine structures when processing coal: headhouses and tipples. The headhouse's main function was to weigh and store coal prior to being delivered to the tipple. The tipple's principal function was to process or sort coal into the various marketable sizes and grades, and load it into railroad hopper cars. An additional function of the tipple was coal storage. The difference in elevation of these two structures with the headhouse located near the mines on the bench level and the tipple at track level, required some type of conveyance system to bring the coal down from the headhouse to the tipple. In general, mines in the New River Gorge used the monitor car system to connect the headhouse to the tipple. Monitor systems used twin monitor cars which worked in tandem to deliver coal to the tipple. The monitor cars held a discrete amount of coal, and were shaped somewhat like a very large barrel on wheels with a trapdoor on the bottom for dumping the coal. In the later years conveyor systems superseded the use of monitors in the gorge. There were many types of conveyors used the West Virginia fields. One of the more popular conveyors used was the retarding or "button and rope" conveyor. This conveyor employed an endless steel rope with buttons or disks which ran in a trough, and impeded the coal's tendency to slide down the trough, thereby conveying the coal to the tipple with minimal breakage.

John Nuttall II, in his history of Nuttallburg, Trees Above, with Coal Below, relates the original Nuttallburg Headhouse was constructed at the time the mine opened. A historic photograph of this structure reveals much about its construction and operation. Constructed circa 1873 or 1874, the Headhouse was built using heavy timbers, which was typical of New River Gorge construction of the time (see historic photo 3).[96] This structure was perched on the edge of the bench level, in line with the main mine entry. The Headhouse was a one-story building, with a gable roof and clad with vertical wood siding. The north gable end roof was extended out over the bench level (probably to allow mine cars to pass around the curve). The Headhouse interior was lit by a series of windows on the east and west elevations and perhaps by electric lights in the later years of operation.

The interior layout of the Nuttallburg Headhouse was probably similar to the one at the Kaymoor Mine with scales, dump and mine car kickback. Photographic evidence suggests the movement of coal in the Headhouse. It appears that the loaded mine cars entered the Headhouse from the west side, where the car was probably first weighed (most likely in the overhang area) and then drifted forward

to a crossover dump. At the crossover dump the mine car was emptied. The empty mine car was then drifted forward to the kickback (visible in the photograph), switched onto the east side tracks and back out of the Headhouse for return to the mine or elsewhere for repairs. Beneath the crossover dump was located a 50-ton bin from which the Monitor Cars were loaded. Each Monitor Car (a steel tube with a hinged door on wheels) had a 7-ton capacity and worked in tandem, with the descending loaded car pulling the empty car up the monitor track. They traveled down the side of the gorge on an inclined plane with parallel tracks. The monitor car would automatically dump its contents at the tipple when a lever was tripped. The tracks passed over the Keeney's Creek Branch of the C&O Railroad on a timber trestle and reached the Tipple (see Tipple section) on a very high and long timber trestle.

The drumrunner, a worker who controlled the Monitor Car's travel, operated a twelve foot diameter wooden drum with 1-1/4 inch steel ropes to lower and raise the monitor cars.(see historic photo 4). The drum was mounted on concrete piers with heavy springs clamped to the axle to act as a braking mechanism, and was apparently located beneath the 50-ton storage bin. The Drumhouse was evidently located adjacent to the storage bin. This was a pulpit where the drumrunner stood to operate the Monitor. The Drumhouse was an open to the weather having only a roof. The drumrunner needed great skill when operating the drum, manipulating the six-foot long control lever to gently lower the loaded Monitor Car to the tipple level in all kinds of weather.

The original Nuttallburg Headhouse and Monitor System was replaced by a modern steel Headhouse and Conveyor in 1925-26. This work was part of the final phase of modernization at Nuttallburg initiated by the Fordson Coal Company.(see historic photo 6). As noted, these structures were erected by the Fairmont Mining Machinery Company of Fairmont, West Virginia.

The Headhouse is of steel construction with three levels. On the first level are located the scales, check weighman's room, car stop and crossover dump; the second level houses the reciprocating feeder; the third level the conveyor head sprocket and motor room, and is where the Conveyor joins the Headhouse. The Headhouse is clad with corrugated steel with the roof supported by King Post trusses, and the structural members used in the headhouse's construction are rolled steel sections, with the columns supported by concrete piers. The flooring was wood. One of the most interesting features of the Headhouse is the northeast corner of the structure. The corner was not supported with a corner column, but rather had an offset column working with a horizontal beam to carry the load from the corner. However, this beam has since been removed and the corner has collapsed. The Headhouse was

constructed in this way to allow the surface haulage to turn the corner on the narrow bench.

The coal movement in the new Headhouse was essentially unchanged from the original Nuttall Headhouse, with coal being weighed and dumped. The principal difference was the empty mine cars were sent out along the bench rather than being returned by the kickback arrangement used in the former Headhouse.

Specifically, the movement in the Headhouse was as follows. The loaded cars or "trip" were collected in the mine using gathering locomotives and were brought to the surface using a haulage locomotive, emerging from the main mine entry just north of the Headhouse. The first car of the trip was drifted into the Headhouse and stopped using the front horns of the Nolan Automatic Scale and Dump Feeder (The Mining Safety Devices Co., Bowerston, Ohio)[97]. This device featured both front and rear horns that were used to stop or "scotch" the loaded cars. These horns worked in pairs with one pair always closed, or engaged, and the other always open, or disengaged. This mechanism worked in tandem with the Phillips Automatic Crossover Dump (Phillips Mine and Mill Supply Co., Pittsburgh, Pennsylvania),[98] with the dump activating the automatic feeder. The front horns were manually opened by activating the crossover dump and the first car was drifted forward onto the scales (probably manufactured by the Fairbanks, Morse and Company of Chicago, Illinois) for weighing; while at the same time engaging the rear horns and stopping the third car. The first car's weight was recorded using a Streeter-Amet Weight Recording Attachment (Streeter-Amet Weighing and Recording Company, Chicago, Illinois), which recorded the actual car weight on a paper tape as well as visually indicating the weight on a dial scale.[99] Following weighing, the rear horns were manually opened, again by activating the crossover dump and the second car fed onto the scales, with the third car being stopped by the closed front horns. Following the weighing of the second car, the front horns were disengaged and the third car was fed onto the scales. As the third car was on the scale, the first car was then on the crossover dump.

At the crossover dump, the first car was scotched. As it entered the crossover dump, a headhouse laborer would attach a hook suspended from the above truss to the front end of the mine car. Then the crossover dump would be activated, dropping the bottom of the first car and depositing the coal into the hopper beneath the car. (There was an additional hopper, adjacent to the main hopper, which was probably used for loose coal.) Once the contents of the car were dumped, the crossover dump car stop was released by the weight of the second car, which depressed a rail treadle as it was fed onto the crossover dump. The empty first car then drifted down an incline to the southern end of the Headhouse. Because of the tandem action of the automatic feeder and the crossover dump, only

one operator was required to activate the dump, which in turn fed cars to the scales and the dump. The empty cars were drifted on a run-out track positioned along the edge of the bench. After all the cars had been weighed and dumped, the system was overridden (which allowed the horns to be in an open position) and the cars were hauled back out of the Headhouse to a secondary mine opening for redistribution in the mine.[100] Reportedly, these trips were often 50 to 60 cars in length.[101] However, the number of cars in a trip would vary with daily production.

After being dumped into the crossover dump hopper, coal was fed onto the Retarding Conveyor by a reciprocating feeder. The reciprocating feeder motion distributed the coal evenly upon an apron, (a flat steel plate), leading to the Conveyor trough, with the reciprocating action derived from an eccentric cam operated by the Conveyor drive. The weight of the coal alone was sufficient to propel it down the Conveyor trough, however, the button and rope system was designed to retard the coal from sliding down the trough. Since coal mined from the Sewell seam is very "friable" or breakable, the retarding conveyor's purpose was to convey coal to the bottom of the New River Gorge with a minimum of breakage. Minimizing coal breakage, translated into increased production of sizes to be screened, lowered operational costs, and uniformly delivered coal to the tipple. Equally important was the Conveyor's ease of operation. The Conveyor operator did not need any particular skills since the Conveyor was basically self-operating, that is, it was either on or off. On the other hand, a great deal of skill and dexterity was required in operating the previous Monitor System to ensure a gentle delivery of the coal. This ease of operation reflected the Ford philosophy of streamlining production at the Nuttallburg Mine.

The Retarding Conveyor had a rope speed of 80 feet per minute and was capable of delivering 125 tons of coal per hour. A 1-1/8 inch wire rope of an alternate and Lang lay type,[102] with cast iron buttons spaced at approximately four foot intervals, traveled down the Conveyor on the lower trough and returned on the upper trough. Both troughs were of wood construction, with steel plates lining the surfaces in contact with coal and the buttons. The Conveyor was powered by a 440 volt induction motor, rated at 75 hp. However, this electric motor was used only to start the Conveyor, for once in operation the weight of the coal powered the Conveyor. There was no mechanical break to slow down or stop the Conveyor, due to the inherent friction of the system.[103] The flywheel was powered by a belt from the electric motor, which in turn transmitted power to the intermediate gear and powered the Conveyor drive sprocket and the buttons and rope. The Conveyor tail sprocket was supported with heavy steel I-beams, set at an angle, which transmitted the torque and load into concrete footers.

The Button and Rope Conveyor was erected in 1925-26 by the Fairmont Mining Machinery Company of Fairmont, West Virginia. It was completely constructed of steel (except the troughs), in an era when most similar conveyors used timber construction. The Conveyor gallery was constructed using steel channels for the bottom chords and steel angle irons for the top chords and other members, including diagonal bracing and the trough supports. On the east side of it was a catwalk with wood flooring. The Conveyor gallery is sheathed and roofed with corrugated steel (now in a state of disrepair, with entire sections gone), and supported by towers that are spaced at either 15-or 45-foot intervals. The Conveyor trough has two graceful vertical curves, with the top curve having a radius of 3,000 feet and the bottom curve with a radius of 1,350.

As advertised in the 1928 Keystone Mining Catalog, the Fairmont Mining Machinery Company designed and constructed button and rope conveyors, and the Nuttallburg Conveyor is shown as representative of Fairmont's engineering prowess.[104] Further, the Coal Age article on improvements at Nuttallburg states that Fairmont designed, fabricated and erected the Conveyor. While this evidence suggests that Fairmont erected the Conveyor, it is not clear that they actually manufactured the components used in the fabrication of the Conveyor. On-site inspection of the extant structure and components reveal the equipment to have been manufactured by the Jeffrey Manufacturing Company (Columbus, Ohio), as the head sprocket matches the ones used to illustrate contemporary Jeffrey advertisements. Thus, it seems that Fairmont Mining Machinery Company purchased Jeffrey drives and other components and designed and erected these components as their own conveyors to suit their clients needs. However, this is not conclusive, since the Conveyor could have been retrofitted by the Jeffrey Manufacturing Company at some time during its years of operation.

Tipples

A tipple is a facility for processing, storing and loading of coal. Generally, coal is processed or sorted into various marketable sizes with the use of screens. Essentially, these screens are very much like the wire mesh used to enclose porches. The major difference is the size of the screen's mesh. Mosquito screens have a very fine mesh, while the screens used in the processing coal have holes from 6" in diameter down to 3/4" and smaller. Furthermore, some screens used square or rectangular holes, rather than round ones.

The sorting of coal was accomplished by passing the coal over multiple screens, beginning with ones having the largest holes first, then progressing down to the ones with the smallest holes.

Thus, any coal smaller than the holes in the screen passed through and the larger pieces, called lump would collect. The remaining coal was screened again and the egg-sized coal would be collected. This process was repeated until all sizes were sorted. In general, this process was facilitated by having three levels of screens positioned such that the smaller coal dropped to a screen with smaller holes beneath it and so forth.

The earliest tipples of the eighteenth century employed gravity screens. (see illustration 5). Coal was dumped at the top of the inclined screening deck, and the weight of the coal propelled it down and over the screen, separating the coal. Again, multiple deck levels were often utilized. By the late eighteenth century, tipples featured shaker and vibrating screens which, induced coal movement through oscillation and vibration. In the case of shaker screens, an inclined deck was used; however, most vibrating screens were horizontal or slightly inclined. Gravity and shaker screens required higher tipple height because of these inclined screens. The horizontal screen arrangement, because it was horizontal, allowed for a lower tipple height. The horizontal screens also allowed for the coal to be picked or cleaned of any refuse that may not have been removed when the coal car was loaded in the mine. Lastly, as the markets for coal changed, so did processing. Coal continued to be screened, but it was also cleaned, or washed, of dirt and other small particulate matter through the use of mechanical, pneumatic, and chemical washers. An entire range of these coal washers were available to mine owners and operators.

There were several sizes of coal screened in the bituminous fields. These sizes ranged from lump, (the largest marketable size), to egg, stove, nut, pea (or stoker), and slack (the finings). Additionally, run-of-mine coal was also available, which was all sizes but with the waste and slack removed. The actual sizes of the various grades of coal depended on which bituminous field produced it. For example, in the New River Field lump was coal 6" and over, egg 6" to 2-1/2", stove 2-1/2" to 1-1/4", nut 2" to 1", stoker 1-1/4" to 5/8", and slack 1/4" to 0.[105]

The coal, once sized, was most often loaded directly from the screens via chutes into railroad hopper cars under the tipple. Sometimes graded coal was stored in bins beneath the screens and loaded at some later time. This was particularly true in the anthracite fields of Pennsylvania. Often raw, ungraded coal was stored at the tipple in huge bins to be screened later, because of rail car unavailability. The storage facility enabled the mine to continue operating without having rolling stock to fill as the coal was being screened.

Historically, there have been at least three tipples at the

during the Nuttall era and the third was constructed by the Fordson Coal Company, with improvements by the Maryland New River Coal Company.

The earliest Tipple at the site was probably erected in 1873-74, when Nuttall first established the mine. Only photographic evidence and a brief description in Trees Above, With Coal Below are available to describe this first Tipple's appearance and operation. (~~see historic photo 2~~). It was located at the north end of the flat plain that comprises the tipple level and was built up against the hillside. It was constructed of wood and had two levels. The uppermost level was a silo at the north end, where the monitor track entered the Tipple and the lower level, with an attached shed on the south end, where the coal was loaded out. The configuration of this building indicates the use of a gravity screening system. In fact, John Nuttall II recalls that "as each monitor dumped its load into the top of the tipple, all of the fine stuff called 'slack' fell through the holes into a large bin..."[106] Specifically, the technology of the period used an inclined stationary bar screen or "grizzly." This system featured parallel longitudinal bars (instead of holes), spaced approximately 5" apart, over which the run of mine coal passed, depositing the slack in a bin below, and collecting the lump at the foot of the screen in another bin or loaded directly into cars. It was common practice during the 1870s to sell the lump coal only and discard the slack, although Nuttall used the slack for coking.[107] Obviously, this was a very crude screening system.

Photographic evidence indicates the lump coal was loaded directly into tandem hopper cars, which were then drifted down parallel inclined planes to a trestle spanning the railroad siding, where they dumped into waiting hopper cars. Following dumping, the empty cars were hauled back to the Tipple using some type of haulage system, perhaps with a drum arrangement of the type used for the monitor system. The slack was stored in a bin and was loaded into lorry (pronounced "larry") cars in the central section of the Tipple. These cars were then conveyed to the coke ovens.

Nuttall was not satisfied with this particular Tipple arrangement and soon after it was built (perhaps the late 1870s) he replaced it. (see historic photos 3, 5, 6 and 7). The new Tipple was constructed adjacent to the Nuttallburg railroad siding, above the C&O mainline. Again, only photographic evidence is available to describe both the Tipple's appearance and operation. Constructed of wood, this structure was wedge-shaped with a high, steeply pitched roof, with the monitor track and trestle entering the structure from the north. Again, the Tipple's configuration, with its high sloping roof, implies the use of gravity bar screens, with the run-of-mine coal screened and the slack stored in bins. Lump coal was loaded out on two tracks, with a third track loading

slack into lorry cars. The slack track traversed the top of the coke ovens to facilitate charging the ovens.

The second Tipple was enlarged, expanding its scope of operations, sometime in the early twentieth century, and occurring no later than 1919. (see historic photo 2). These improvements were probably performed by the Nuttallburg Smokeless Fuel Company. The 1922 Keystone Coal Field Directory indicates the company was using shaker screens in their coal preparation at this time. Photographic evidence supports this, showing the expanded Tipple with what appears to be new storage and additional screening facilities. Perhaps coal refuse picking tables were also installed since they were the prevailing technology of the era, but this is uncertain. The Nuttallburg Smokeless Fuel Company shipped run of the mine, slack, nut, egg, and lump.[108] This Tipple was operating when the Ford coal interests purchased the mine.

The third, and only extant Tipple was constructed in 1923-24 by the Roberts and Schaefer Company of Chicago, Illinois for the Fordson Coal Company. ~~(see historic photos 13 and 14)~~. This tipple is of all steel construction and has four main parts: the Conveyor House, the Screening Room, the Coal Storage Silo, and the Loading Room. The Conveyor House is where the Retarding Conveyor enters the Tipple and originally was the machinery support structure for the Marcus screen drives (see historic photo 6). This original rectangular structure was constructed of poured reinforced concrete with the lower level (basement) open on four sides, and the screen drives on the upper level (the upper level was probably enclosed, but its configuration is unknown). Additionally, this structure was the delivery point for the Conveyor and the Monitor System (although, apparently the monitor dumped onto a conveyor situated perpendicular to the screens and the coal was conveyed to the screening table). Apparently, the Tipple was designed in anticipation of the Conveyor's construction. When the Conveyor was constructed, the Conveyor House was modified with the addition of two more levels. The second and third levels added are of steel construction with wood floors. These new levels housed the conveyor tail sprocket and conveyor return trough respectively, while the first level was the delivery point of the Conveyor. Apparently the basement part of the structure was walled-in with brick at the time of the Conveyor's construction and evidently served as the Tipple Boss's office. The first level measures approximately 14'-4" by 19'-8". The Screening Room housed the Marcus screening equipment, which extended into the Conveyor House to the Conveyor delivery point. The Screening Room apparently dates to the Tipple's construction and features skylights for illuminating the picking table. (see photo 12). The Screening Room was extended into the Conveyor House with steel beams and wood flooring. This room measures approximately 16'-11" by 52'-2". The Silo was used for run-of-mine coal storage, and was processed as

Silo was used for run-of-mine coal storage, and was processed as needed. This structure measures approximately 15'-4" by 15'-9" by 49'-5" tall. The Loading Room housed both the loading booms used for loading coal into railroad cars, and the house coal loading facility. This room measures approximately 30'-6" by 36'-11". It should be noted that the delivery point for the Conveyor, Screening, and Loading rooms are on the same level and are approximately 14'-0" above the track level. (see illustration 6).

In general, rolled structural steel sections with riveted joints are used throughout the Tipple and is clad with corrugated steel. The roof of the Loading Room is supported by Warren trusses, and the roof of the Screening Room/Conveyor House is supported by King Post trusses. Three railroad tracks are located beneath the Tipple to facilitate the loading of coal.

The Roberts and Schaefer Company manufactured two types of horizontal screens: bi-level and tri-level screening systems. Both featured a combined picking and screening table. The tri-level screening system seems to be an improved design of the bi-level arrangement. It gained popularity in the 1920s, while the bi-level screens were popular in the early part of the century. Consequently, the Marcus horizontal screen and picking table system installed at Nuttallburg most likely featured a tri-level deck arrangement. (see historic photo 13).

In general, these tri-level deck screening tables featured a refuse trough above the table, used for waste in the picking process. The waste was vibrated down the trough collecting in a bin. It is unlikely the Nuttallburg Tipple equipment had this feature. The Marcus screens generally screened four sizes of coal, using screens with 1-1/8", 2", 3", and 5" diameter perforations. Additionally, these screens could be interchanged with screens having other size perforations, so that any mixture of sizes was possible.[109]

The Marcus screen drives used differential motion: a slow forward stroke combined with a rapid return stroke. This differential motion induced a forward wave or motion in the screening table, and the coal was vibrated down the screening table, passing over the screens.[110] At Nuttallburg, the flywheel and drive for the Marcus horizontal screen was located below and behind the conveyor tail sprocket, at approximately a 45-degree angle. Apparently, the drive was powered by an electric motor and was belted to the flywheel. Both the slow and rapid strokes were obtained by the use of an eccentric crankshaft and rod arrangement. Parts of this eccentric system are still visible beneath the flooring of the Tipple at the south end of the screening room, just adjacent to the outside loading boom.

The Marcus screening and picking table installed at the time of the Tipple's construction is no longer extant. The following discussion of its operation is based on a lecture given by Warren Roberts, of the Roberts and Schaefer Company in 1916, to the West Virginia Coal Mining Institute. Coal from the Retarding Conveyor was deposited directly onto the northern end of the table. As the coal vibrated down the northern end of the table at approximately 45 to 50 feet per second, any slate or refuse not cleaned in the mine was picked from the coal (coal could be picked at any part of the table). The coal then flowed down the table over the first set of perforations, and the nut and slack passed through the screen to the middle deck onto a second screen. The slack was removed from the nut and passed to the lower deck, and was then transmitted on a dead plate (a plate without any holes or screens) to the slack chute. The nut was carried forward on the middle deck, and vibrated down to the lower deck. As the nut passed through a closable gate or valve, it was deposited on the middle loading boom. The balance of the egg and lump coal was carried to the south end of the upper deck and deposited directly upon the outside loading boom (see illustration 7).[111]

A mix of grades was possible both by interchanging screens and the opening and closing of the gates. The gates or valves controlled the flow of coal. Closing all the gates permitted the run-of-mine to be conveyed to the end of the table and loaded out on the outside loading boom; or it could be directed into the Silo coal elevator adjacent to the Screen Room. Precisely how coal was directed to the elevator is unclear.

The bucket-type elevator (now collapsed) rose up the side of the Silo, or storage bin, and allowed for coal to be stored for future use. The stored coal had a separate screening system. Gravity deposited the coal onto a Roberts and Schaefer shaker screen, an oscillating screen which allowed the nut and slack to pass through onto a second screen. The slack passed through this screen and was conveyed by a archimedean screw (chain driven from the shaker drive) back to the slack track. The remaining coal was deposited directly into a chute beneath the shaker screen and conveyed down to the outside track by gravity. The remaining coal passed under the Marcus screening table and was dumped directly onto the inside loading boom for loading out.

Loading booms installed at the Tipple were of a Marcus design, featuring a motor driven metal conveyor belt. The upper end pivoted, permitting the lower end of the boom to be raised or lowered as required when filling a coal car. Loading booms were used at tipples because they helped minimize the breakage of coal by gently conveying it into the waiting coal car. The coal car was loaded by lowering the boom into the car and conveying coal into it. As the car filled, the boom was raised and the coal car moved

forward, then the boom was lowered again and the filling continued until the car was filled to capacity. This process was repeated until all waiting coal cars had been loaded. Each loading boom was raised and lowered with an electric hoist suspended below the roof truss, and a process aided by a pair of counterweights, located in pockets formed by the Tipple's support columns that flank the booms.

Artifactual evidence suggests that the coal cars were moved at track level with a winding engine. The empty cars were pulled up the slight incline of the Nuttallburg siding with the winding engine, and the full cars drifted by gravity back down to the C&O mainline. The winding engine eliminated the need for a yard engine to move coal cars. The winding engine was located downstream of the Tipple between the outside railroad track and the embankment above the C&O mainline.

This haulage system may have also been used for "layer loading," a technique of loading hopper cars in layers in an attempt to produce a more uniform product, the same size and quality coal in a given railroad car. Additionally, this technique was used to produce mixtures of coal such as a premium grade mixed with a lesser grade, or any combination of sizes and grades desired by a customer. Basically the process was very simple with two to six connected hopper cars and that passed under the loading boom two or more times, with each pass partially filling the car until the car was full (see illustration 8).[112]

The inside loading boom was used not only to load coal cars, but also to convey house coal across the loading room to another conveyor, which then transported it to a hopper at the northeast corner of the Tipple. This coal was sold to the residents of Nuttallburg to be used for heating and cooking.

The processing and loading of coal remained essentially unchanged during the early years that Maryland New River operated the mine. However, in 1952 Maryland New River modified the tipple with new processing equipment installed at the downstream end of the structure. In particular, they installed a Belknap Chloride Washer for processing coal (~~see historic photo 84~~).[113] This equipment was probably installed as a move to modernize the facility in an attempt to tap the growing market for clean, sized coal for use at coal-fired power plants. In 1952, Maryland New River began offering a "special stoker" coal sized from 1-1/4" to 5/8", which implies their intended market was utility and industrial power plants.[114] It is unclear who installed this equipment, however, the Kanawha Manufacturing Company of Charleston, West Virginia (a tipple and preparation plant engineering and erection concern), held a franchise for manufacturing the Belknap Chloride Washer and may have been

responsible for its erection at the Nuttallburg Tipple.[115]

The Belknap process was a "dense-media" process that used a low density calcium chloride solution coupled with a mechanical impeller or agitator which caused an upward movement within the solution, thereby separating the coal from the denser refuse. The Belknap Chloride Washer was shaped much like a soup ladle, with the calcium chloride reservoir analogous to the ladle bowl and the conveyor the handle (see illustration 9). Typically, the raw coal was dumped into the solution and floated, while the refuse sunk to the bottom of the washer. The clean coal was conveyed up the drag conveyor, through a dewatering trough, where it was sprayed with water and then discharged at the top of the washer, to be either loaded out or stored. The refuse on the bottom was conveyed to one side of the machine and conveyed to the top, where it was discharged into a refuse bin. In general this process was used to clean coal sized from 6" egg to 3/8" pea, but was usually set up to clean only one size of coal. The calcium chloride solution used in the Belknap process not only cleaned the coal, but also made it dustless and nonfreezing.[116]

The Belknap Chloride Washer was installed at the Nuttallburg Tipple in 1952. This installation apparently required the removal of the original Marcus picking table screen to allow for the installation of other new equipment. The original coal delivery point was extended so that the coal would dump onto a new drag conveyor located parallel to the inside loading boom. Physical evidence suggests this was accomplished by shortening the original delivery chute and welding a section of a pan conveyor to this chute. It was then extended, with additional pan conveyor sections, approximately 35' to the drag conveyor bin. The drag conveyor was installed perpendicular to the original screening arrangement and passed upward through the silo into the downstream addition at approximately a 30 degree angle. Coal traveled up this conveyor, passing over the slack screen midway up the conveyor. The slack passed through this screen into a storage bin for later loading and the balance of coal continued up the conveyor. At the top of the conveyor, the coal passed over the stoker coal screen and was then gravity fed into the Belknap Chloride Washer. Here as described before the coal was cleaned and the coal conveyed back into the Tipple where it was loaded out on the center track. Artifactual evidence suggests that the disposal of refuse varied slightly at the Nuttallburg Tipple. Instead of being conveyed up the washer, it was apparently conveyed up a separate drag conveyor located parallel to the washer and transferred to a large timber bin located northwest of the Tipple. The remaining lump coal would either be directed into a chute and loaded out or stockpiled and cleaned later.

Refuse

Refuse is a waste byproduct of coal mining. When coal was blown down, part of the mine roof was also blown down. Generally the roof was composed of shale (generically called "slate"), or a combination of shale and coal called "bone coal." The refuse was cleaned from the coal while the coal was loaded into mine cars. A miner was paid for the clean coal he mined, not for refuse, and he was responsible keeping slate and refuse out of the loaded mine car. This refuse was generally left inside the mine; however, the Nuttallburg site is littered with slate and bone coal, which implies that it was brought outside the mine and dumped.

Historically, slate and other refuse at Nuttallburg may have been conveyed out around the east side of the bench level and dumped, because there are large piles of slate and bone coal in this area and this area was mined first. Photographic evidence from the Ford era depicts a huge scar which indicates that refuse was dumped in the area west of the conveyor (~~see historic photo 13~~). In fact, this photograph shows a timber platform constructed on the edge of the bench apparently built to facilitate refuse disposal.[117] The refuse was probably conveyed to the dump sites in mine cars, but it is unclear what type of dumping mechanism, if any was employed. It is possible that the refuse was shoveled by hand or some type of rotary dump was employed. Additionally, refuse was picked at the Tipple.

Coke and Coking

Coal that is burned in a limited atmosphere produces coke. In the coking process, impurities, such as sulfur, are driven off and the resultant coke is virtually pure carbon.

The manufacture of coke was a very important sibling industry to coal mining at Nuttallburg and many other mine sites in the New River Gorge. Coke was used in the manufacture of pig iron and had many other uses including blacksmithing.

One of John Nuttall's earliest improvements at Nuttallburg, were the construction of coke oven batteries. He built 80 beehive coke ovens, each having a five-ton capacity. These ovens were constructed in double batteries radiating out from the tipple. Photographic evidence indicates that the coke ovens were located on both sides of the trestle leading to the tipple, and another bank was constructed on the downstream side of the tipple (these are still extant). The ovens were charged using lorry cars, from tracks that traversed the tops of the coke ovens. These tracks were interconnected and passed under the tipple, where the lorry

Each oven was charged with five tons of slack (used because it fused better than other grades of coal), ignited and allowed to burn with a controlled draft for approximately 24 to 48 hours. After burning, the coke was drawn from the ovens by the coke drawers, extinguished or "quenched" with water, loaded into railroad cars for shipment to western and eastern markets. Probably the greatest consumer of Nuttallburg coke, was the steel industry, whose mills used it in the production of pig iron, the first step in the steelmaking process.

The earliest West Virginia mine records (1883) indicate that 17,248 tons of coke were produced by the Nuttallburg coke ovens and shipped on the C&O Railway. Coke production at Nuttallburg fluctuated over the next 40 years; some years as many as 20,608 tons of coke was manufactured, and other years there was no coke production. This was due to changes in market demand for coke. When market demand was high, the ovens were in blast, and when it was low the ovens went out of blast. The Ford era spelled the end of coking at Nuttallburg as the mine's entire coal output was shipped to Ford's River Rouge Plant in Michigan. Coke for Ford's River Rouge Plant was produced on-site, effectively ending coking at Nuttallburg.

Another factor causing the cessation of coke manufacture at Nuttallburg was the advent of the Koppers (and others) byproduct coke oven. The Koppers method captured the gases released in the coking process and these gases were converted into coal byproducts such as naphthalene and other chemicals. Clearly, it was more profitable to capture the gases released in the coking process and manufacture additional products than to use the beehive oven to merely produce coke.

All available evidence indicates that the Maryland New River Coal Company never coked coal at Nuttallburg, and consequently the ovens have been idle since 1919 or 1920. Today, 46 beehive coke ovens sit idle at the Nuttallburg Mine site, although many more may be hidden under the tons of mine refuse and kudzu that cover the Tipple level site.

Section 2.3 Ancillary Mine Structures

Fan House and Ventilation

Ventilation is an important aspect of coal mining regardless of how the seam is mined albeit deep, slope, or drift mining. Ventilation is required to clear the mine of dangerous gases that are released by mining operations. These gases were collectively known as "damp" (from the German word for vapor or fog, dampf). For instance, "fire damp" (methane gas from decaying vegetable

matter and roof supporting timbers) can cause mine explosions, or "black damp" (carbon dioxide) can cause death from asphyxiation.[118] Ventilation was equally important was for clearing black powder smoke and, later, coal dust from the mine workings. High concentrations of coal dust combined with methane gas could cause devastating mine explosions; such as the Monongah Mine explosion at Monongah, West Virginia in 1907.

Early New River drift mines like the Nuttallburg Mine were ventilated using the traditional chimney or furnace system. This was a variation on the Welsh deep mine method of digging a shaft parallel to the main shaft and building a fire at its base. The updraft caused by the heat rising up the shaft drew air through the mine workings, thereby ventilating them. Similarly, the drift mine ventilation method used a brick or stone chimney and firebox, constructed at the mouth of an entry air course (parallel to the main entry). The air flow could be regulated with the use of trapdoors, which could be opened or closed, as required to regulate the airflow through the various mine sections.[119] The furnace was the predominant form of mine ventilation prior to the advent and widespread adoption of ventilating fans.

Around 1900, the first mine ventilating fan was installed in the Nuttallburg works. The 1901 state mine report notes this fan was an 18-foot force fan (blowing air into the mine), and provided adequate ventilation.[120] Later state mine reports indicate the use of a 16-foot steam driven fan (by Crawford and McCrimmon Company, Brazil, Indiana) which could be operated in either a blowing or exhausting mode.[121] In about 1914, a five-foot booster fan was installed at the mine, acting in tandem with the larger fan to ventilate the mine. The 1914 mine report states that this system worked with limited success.[122]

After 1914, the West Virginia Department of Mines reports no longer furnished information about mine ventilation, so consequently there is no state documentation of the later ventilation methods at Nuttallburg during the Ford or Maryland New River eras.

Fortunately in 1927, Coal Age featured an article on Ford's renovations of the ventilating system, which was installed at the time the new Headhouse and Conveyor were constructed (see historic photo 11). The steel Fan House measured approximately 6' by 12' and featured a steel exhaust hood (probably by The Jeffrey Manufacturing Company, Columbus, Ohio). It was constructed roughly 350 feet above the mine's workings on the canyon's plateau and about 9000 feet from the main mine portal. (Nothing was reported about constructing a ventilating shaft, so the old Nuttallburg Colliery Company slope mine shaft located near Edmund was probably used, but this is only speculative.) A 3' by 5' multi-blade fan

which was chained driven by a 75 hp 3-phase 2,300 volt variable speed electric motor with an automatic starting motor (no equipment manufacturers were reported) was used for ventilating the workings. The variable speed motor allowed changing the exhaust fan's output, as required due to fluctuations in the natural airflow which were caused by changes in the ambient outside temperature. During the summer, the airflow within the mine was greater and consequently less mechanical ventilation was required, which translated into a slower motor speed. Conversely, in the winter when the airflow was the least, more mechanical ventilation was required and therefore a greater motor speed. In addition, the fan could be started, stopped, or its speed changed from underground in the mine. The remote fan speed control eliminated the need for a Fan House operator to monitor the fan speed, and only required an once a month inspection.[123]

During the Maryland New River era a new Fan House was constructed. The Fan House, still extant[124], was built at some time in the late 1940s or early 1950s. It is constructed of concrete block with a concrete slab roof, and features a steel exhaust hood on the east elevation. The L-shaped structure measures approximately 23' (south elevation) by 26' (west elevation) by 16' (east elevation), with a return of approximately 16' (north elevation) by 13' (east elevation). The south wall had steel blast doors leading to the mine opening, with a separate door entering the motor room. The interior of the Fan House is divided into three parts: the passageway to the mine, with an interior door; the blower room, perpendicular to the passage; and the motor room. Most of the equipment in the fan house is still in-situ, although the motor has been stripped of its windings.

The equipment used in the Fan House included: General Electric Company (Schenectady, New York), Three-Phase Induction Motor, Model No. 17889, Type FTR-532 8 30 900; and a Jeffrey Manufacturing Company (Columbus, Ohio), Centrifugal Fan, Size 4'x 2', Serial No. 760. The electric motor was belted to a flywheel in the motor room and power was transmitted to the fan through a pedestal mounted driveshaft. The fan drew air through the mine and exhausted it through the exhaust hood on the east side of the Fan House. The patent date for the blower motor is 1924, which implies that this equipment was previously installed at another location, however probably not at the above described Fan House.

The Maryland New River Coal Company initiated rock dusting, the process of spraying or "dusting" the mine with limestone dust, in about 1952.[125] The dry limestone dust was sprayed on the working face, mined coal, in old workings, on the roof, and anywhere coal dust was likely to accumulate. This process was used to keep the coal dust down, therefore making it less likely to mix with methane gas and lead to mine explosions.

Powerhouse and Substation

Coal mine sites needed steam and electric power to operate ventilating fans, locomotives, and other mine equipment. Steam engines were the prime movers during the mid-to late-nineteenth century and were often used pump water from the mine workings and later to power ventilating fans. By late in the century, they were used to power dynamos for the generation of electricity. Powerhouses were the structures which housed this electric power-generating equipment. By the 1920s, mines began purchasing electrical power from commercial generating stations. The use of commercial power at mines required Substations to convert high voltage down to a lower, more usable voltage level.

Historically, steam driven electric dynamos generated power for the Nuttallburg Mine. The 1901 West Virginia mine report indicates the Powerhouse consisted of a dynamo, boilers, and 150-horsepower (hp) steam engine. By 1915, the Powerhouse, located near the tipple was upgraded and consisted of two steam engines rated at 150-hp each with boilers, driving dynamos producing a total of 550 volts direct current.[126] By the 1920s, power for the mine was being purchased from the Virginian Power Company, a commercial generating station, which furnished electricity for many of the mines in the New River Field.

The above ground Substation located west of the main mine portal, was constructed in the 1925-26, during the period of Ford renovations. Another Substation was also built at this time, and was located inside the mine near the center of the electrical load.[127] (There is no physical evidence to suggest any earlier substations, however the mine site probably had at least one, since the mine had been purchasing power for quite some time.) The Substation has a rather interesting method of construction, employing cut stone to face the exterior, and brick to face the interior. The roof consists of a concrete slab supported by I-beams. This type of fireproof construction was employed to ensure the safety of Nuttallburg employees in the event of a substation explosion (heat could build-up in the electrical equipment and cause explosions). Additionally, West Virginia state law required all mine structures located near mine openings to be of fireproof construction.[128] The structure measures approximately 21' wide by 15' deep by 13' high. The structure was built on a poured concrete foundation and floor with remnants of the heavy electrical equipment, such as conduit extant in the interior (see historic photo 9).

The Nuttallburg Substation (and substations in general) was used to "rectify" or convert alternating current (AC) to direct current (DC), and step down the high voltage AC to a lower voltage DC. This conversion was necessary to operate the DC powered

haulages, Conveyor and other mine equipment. The original Substation equipment installed during the 1925-26 renovations, was a synchronous-converter which rectified and stepped down the 2,200 (or higher) volt AC to 275 volt DC used at the mine. The synchronous-converter had an automatic control system which maintained a constant AC voltage to the converter, which in turn maintained and regulated the DC voltage, furnishing a constant power level to the operating equipment. In general, earlier substations did not have automatic controls and were manually operated. Manual control could not respond instantaneously to power surges or attenuation, which often resulted in electrical fires or other equipment damage. Automatic control devices also economized in the amount of copper wire used for electrical distribution throughout the mine.[129]

Cap and Powder Houses

Cap and Powder Houses were essential mine structures, housing the black powder (and later permissible powders and other explosives) and detonating caps used to blow down coal. As they housed very volatile products, these structures were situated on the edge of the bench level so that in the event of an explosion, the force of the blast was directed outward, away from the mine.

Historically, Cap and Powder Houses were located at Nuttallburg as they were at all working mines of the period. The 1922 Nuttallburg map shows a Powder House located on the tipple level; however, all vestiges of this structure have been erased. Today, the Cap and Powder Houses are located on the bench level. These structures are located west of the main portal and are built into the hillside below the bench, probably date from the Ford era. The walls of each structure were constructed of concrete block faced with stucco, with a concrete slab roof and steel blast doors. The Cap House is a scaled down version of the Powder House.

Sand Houses

Sand was an important commodity to the mine site, since it was used by both mine haulage and railroad locomotives for extra traction in rainy, icy or snowy conditions. Extra traction was gained by applying sand beneath the drive wheels. The Sand House was used both for drying and storing sand.

There were two Sand Houses at Nuttallburg. The first was located on the bench level adjacent to the Headhouse. This Sand House supplied sand for the mine locomotives and haulage. It was a low brick structure with a shed roof, and probably dates to the 1920s renovations. It was divided into three areas with a raw sand

bin, sand dryer, and dry sand bin (see historic photo 10).[130] Today only a concrete pad and some brick walls remain of this Sand House. The pad measures approximately 10' by 45'.

The other Sand House was located near the Tipple at the east end of the coke ovens. Physical and photographic evidence suggests this was a low structure with a shed roof. The Sand House's function was probably similar to its bench level counterpart, except it supplied sand for the locomotives and other rolling stock. Today, the only remaining vestiges are stone walls and a large quantity of sand. These remains measure approximately 43'-0" by 15'-5".

Oil Storage Tank

The oil storage tank is located near the upstream end of the Tipple. Oil was used to spray coal and slack in loaded railroad cars. This served two purposes. First, it kept the coal from freezing; and second, it kept the slack from blowing out of the open car during transportation. Artifactual evidence in the Tipple's Loading Room, in the form of extensive piping and pumps (much like an automobile water pump), further suggests the coal was sprayed with oil as it was being loaded out on the loading booms. The Maryland New River advertised "dustless treatment" for their coal products, and apparently this was the process of oiling down the coal.[131]

Company Store

The purpose of the company store is well known. Essentially everything a miner or his family needed from food to clothing and furniture, were available from the company store. However, these goods could be purchased only with company scrip and with automatic deductions from the miner's pay.

The remains of the structure identified as the Nuttallburg Company Store are located on the Tipple level, at the west end of the bank of coke ovens. This structure apparently housed a general store on the ground level and a furniture store on the upper level.[132] Only the stone walls of the lower level remain and measure approximately 44' by 31'.

The Maryland New River Coal Company Store was located at Edmund, along West Virginia State Route 82 (Ames-Lansing Road), near its junction with Fayette County Road 7. The store was apparently a wood structure. However, today there are no extant remains only an empty lot.[133]

Miscellaneous Shops and Buildings

There are many miscellaneous buildings generally associated with mine sites. Blacksmith, carpenter, electrical, and machine shops, tool and lamp houses, and a foreman's or mine boss's office were all integral parts of a well-designed mine complex.

Historically, Nuttallburg had both blacksmith and carpenter shops, but there are no extant remains or any indication where these works stood.[134] The mine undoubtedly had electrical and machine shops. These shops were probably located along the eastern bench past the Headhouse. There are unidentified shop remains at this bench location. The Lamp House, used for miners' lamp storage and repair, was probably located adjacent to the Substation, near the main mine portal. Photographic evidence suggests the Foreman's Office was adjacent to the Substation. This structure was a small, single story wood building.[135] Artifactual evidence in the form of concrete blocks and a foundation footprint validate the photographic evidence. Additionally, both the Foreman's Office and the Lamp House would have been conveniently located at this site, and could have been combined under one roof.

There was once an entire community at Nuttallburg perched on the walls of the gorge and on the bottom land that included miner housing, two churches, the Nuttall Depot, and many other structures. Apparently company housing was scattered around the Tipple with many of these homes being located downstream from the Tipple and near the coke ovens. Today, very little of Nuttallburg proper still exists. All wood structures have rotted away long ago in the humid climate at the bottom of the gorge, leaving only foundations. Additionally, kudzu, a climbing vine has literally covered the site, making the location of extant cultural remains very difficult. Other than the Tipple, Conveyor, and Headhouse little of Nuttallburg still remains besides a few stone foundations. Some of these ruins have been identified. They include an Ice House, a Club House for miners' social activities (probably the white Club House), and a Well House that once apparently housed a pump for the Nuttallburg water supply and fire hydrant system.[136]

Section 2.4 Transportation

Underground and Surface Haulage

Underground and surface haulage were needed to transport coal cars within a mine and around a mine site (see historic photo 8). Before the turn of the century, animal power was the traditional system of haulage. Horses or mules were employed to haul the

loaded coal cars from the mine works and then return the empties. Later as mining technology evolved, steam and electric locomotives replaced animal power.

Historically at Nuttallburg, mules were used to convey coal within the mine and to the Headhouse. When John Nuttall established the mine, he bought 30 mine mules and hired 25 drivers. As coal mining evolved at Nuttallburg, so did the system of haulage employed at the site.

The advent of locomotives, or in mining vernacular: "motors," were introduced to the Nuttallburg Mine in about 1901. Mine reports for that year describe this locomotive as a "7-1/2 ton electric motor, which brings 24 mine cars per trip, having a capacity of 1-1\6 tons each."[137] The adoption of locomotives at the mine instituted a period of transition for the system of haulage at Nuttallburg, because the mine continued to use both mules and motors until the advent of the Ford era in 1920. Ford's modernization program spelled the end of the use of mine mules. After Ford acquired the mine, mules were replaced entirely by electric locomotives, both above and below ground.

Two types of locomotives were used in the mines for gathering and haulage. Gathering motors collected loaded mine cars from the rooms, towing them to the main entry and for distributing the empty cars back to the various rooms. Haulage motors were used to tow the gathered mine cars out of the main entry to the headhouse, and to return the empties for redistribution by the gathering motor. Additionally, several electric power sources such as storage batteries, and alternating and direct current (AC/DC) were employed to operate these motors. (Steam and pneumatic motors were employed in other mines, but will not be discussed here.)

The storage battery locomotive was powered by storage batteries of the type used in modern automobiles and motorcycles and when discharged they could be readily recharged. The advantages of this type of power source were that it could be operated without dangerous overhead wires and could operate during periods of power failures. More importantly, battery-type motors were safer in gaseous mines, having no open sparks as with trolley-type motors.

On the other hand, the AC/DC system (generally DC was used more often than AC) often employed trolley-type pickup arrangement, where the live source was connected to the motor via a conductor sheave, which rolled along a suspended wire, and the current grounding through the rails. The disadvantage to this system was if the power failed, the motor stopped running. An additional problem resulted when the rails were not bonded or tightly connected. This caused the ground to fail and the motor would stop

dead. Above all, the trolley wires were live, and there was a great probability of electrocution if a miner came in contact with one. Typically, gathering motors were battery-powered and the haulage motors were of the trolley-type.[138]

The 1924 Keystone Coal Mine Directory indicates the Nuttallburg Mine was using both storage battery and trolley motors.[139] Undoubtedly, the storage battery motor cited was used as a gathering motor and the trolley motor for main entry and surface haulage. Today, physical evidence of the trolley system litter the mine site, with remnants of trolley insulators and other electrical paraphernalia abounding. This artifactual evidence substantiates the use of trolley motors at Nuttallburg and seems to indicate they were used up to the time the mine ceased operations.

Hoist House and Mountain Haulage

The Hoist House and Mountain Haulage were used in tandem to move men and supplies from the tipple level to the bench level. The electric winding engine in the Hoist House raised and lowered a car or haulage on an inclined plane, much like a monitor system.

The Hoist House is located above and just west of the main mine portal on the bench level. It has a poured concrete foundation and walls with a corrugated steel shed roof, supported by wooden rafters (now collapsed). This structure is approximately 16'-6" by 13'-0" by 8'-7" tall. The hoisting engine is intact; however, it lacks a manufacturer name plate, thus is not definitely identifiable. The electric powered hoisting engine is of the friction clutch-and- brake type. The Hoist House likely dates from the 1925-26 period of renovations because of its poured concrete construction. Photographic evidence shows that the Hoist House was in use prior to the construction of the steel Headhouse and Retarding Conveyor, and implying it was constructed at the time of these renovations.

The haulage vehicle was raised and lowered with a steel cable that was wound by the hoisting engine. The operator gained access to the Hoist House from steep steps leading up to it. The operator ran the hoisting engine blind, because he could not see the bottom of the gorge, instead relying on a dial gage marked "top" and "bottom." He stopped the engine accordingly. There apparently was a covered station or loading area located at the downstream end of the Tipple.

The Mountain Haulage was single-track inclined plane. It was probably constructed to bring men and supplies from the tipple level at the bottom of the New River Gorge to the bench level. It probably originally served the purpose of bringing men and

equipment up the gorge to the bench level during the construction of the Headhouse and Conveyor. Vestiges of the right-of-way can still be found today, but none of the track is extant and no Mountain Haulage vehicle or other artifactual evidence has been found.

Nuttallburg Suspension Bridge

An important engineering achievement at Nuttallburg occurred at the turn of the century: the construction of the Nuttallburg Suspension Bridge, connecting Nuttallburg with South Nuttall, or Browns, on the south side of the New River (see historic photo 14). The 340-foot pedestrian suspension bridge was constructed in 1899 by the John A. Roebling's Sons Company of New York, the famous bridge company responsible for erecting the Brooklyn Bridge. The Nuttallburg Suspension Bridge featured twin masonry towers constructed of cut stone, with the south tower 22' high and the north tower 16-1/2' high. Each tower is approximately 5'- 3" square at the base. The six-foot wide walkway was suspended from 1-1/4" cables carried on cast iron saddles and anchored at each shore in solid bedrock. The saddles were capped with pyramidal-shaped metal covers. The floor system was further stiffened with wind guys that are also anchored in bed rock.[140]

The Nuttallburg Suspension Bridge is no longer extant, having been demolished in the late 1950s. The towers, however still stand and vestiges of the cables and anchorage systems also still remain.

Section 2.5 Conclusions

The decline and closure of the Nuttallburg or Dubree No. 4 mine can be attributed to many causes. The most obvious reason for its closing is that it "blew out," or was worked out. The mine had operated for close to a century and many millions tons of coal had been won. In fact, approximately 4.3 millon tons had been mined at Nuttallburg from 1897 to 1958. Department of Mines reports indicate that the seam narrowed through the years, probably reaching a point of diminishing return (the cost of winning the coal exceeded the return or profit on the coal).

The other primary reason for its decline can be traced to the changing social patterns following the Second World War. Rural youth no longer were staying in their old established communities and were moving to urban industrial areas in search of better paying jobs. Improved roads made it possible for rural youth to move easily to other communities far away from the New River Gorge.

Markets for coal were also declining due to the dieselization

of the railroad industry. The advent of dieselization effectively ended the day of the steam locomotives and therefore, their need for coal. Also an important factor was the New River Field was in general decline with the Fire Creek and Sewell seams being worked out and causing county production to fall.

Additional factors include the widespread mechanization of the mining industry which led to fewer jobs for miners. Still, the Nuttallburg Mine and the Fayette County mines production had at one time dominated all other mines in West Virginia, reaching their pinnacle and then declining with no chance of recovery.

Section 2.6 Call for Further Research

The reader should bear in mind that while the Nuttallburg Mine began operations around 1873, information about the early years of the mine's operation is sketchy at best due to the unavailability of written material on the mine and the lack of industry trade journals. Additionally, information available about the Maryland New River era is also incomplete at best, as is also the case with the Garnet Coal Company era. However, the Ford era was much better documented, because of Ford's high profile and the shock wave sent through the coal industry, when he began to purchase mine properties. Consequently this report focuses largely on the Ford era. Clearly there is a need for further research. This research should take the following form.

Oral History

There is an immediate need to initiate the collection of oral histories of former Nuttallburg employees. These men are now in their august years and their time is running out. They need the opportunity to tell their stories. These oral histories should focus not only on the Nuttallburg mine technology (for instance how the coal was extracted or the Tipple's operation), but also their life experiences at Nuttallburg both in the mine and in the town. This collection of oral histories would then be added to the New River Gorge Oral History Collection at Glen Jean.

Nuttallburg

More research is required to document the corporate aspect of Nuttallburg, particularly on the very early and very late years of the mine's operation. Further documentation of the Nuttall years may be virtually impossible, unless some new materials are unearthed from someone's basement or in some forgotten collection. The research on the later years would be much easier to obtain, from former Nuttallburg employees. Oral histories would greatly strengthen this body of research.

New River Field History

There is a definite need for a comprehensive history of the New River Field. The foundation of this work has already been laid with HAER's Kaymoor Recording Project and the Nuttallburg Recording. Additionally, scholarly work has been undertaken in the writing of the New River Series focusing on the towns of Kaymoor, Sewell, and Thurmond.

Technological History

This paper is fairly comprehensive insofar as documenting the technology of the Nuttallburg site, but further research would be welcomed to enhance and supplement the information already found. This research might examine other types of mining technology not discussed in this paper. From this research would be developed a contextual history of coal mining technology. This contextual history might be used by cultural resource surveyors, HAER teams or anyone else that would need a body of information to help identify or recognize various types of coal technologies.

Section 2.7 Appendices

Appendix I

Property situated at the Keeney's Creek and Nuttallburg mines. From deed recorded in Fayette County Deed Book 27, p. 58.

1-Store House
3-Houses at Nuttallburg
11-Double Houses at Nuttallburg
20-Single Houses at Nuttallburg
13-Single Houses at Nuttallburg
3-Single Houses at Nuttallburg
23-Single Houses at Nuttallburg
1-Single House at Nuttallburg (Mine Boss)
1-Single House at Nuttallburg (Doctor's)
1-Stone Powder House
1-Hay House
1-Brick House
1-Corn house
2-Stables
1-Work Shop
1-Scale House and Scale
1-Blacksmith Shop
1-Tipple and Trestle
3-House, New, on Mountain
1-Pump and Boiler
Water Pipes, Hydrants and Reservoirs
1-Fan, Boiler and Houses, New
1-Electric Plant, Complete
80-Coke Ovens
220-Bank Cars
32-Mules
1-Vault
2-Marvin Safes
2-Drums and Ropes and Houses
2-Jeffrey Mining Machines
1-Tipple, Keeney's Creek
1-Steel Rail, Tools, etc.
1-Scale House and Scale; Blacksmith Shop
6-Houses (Double) Keeney's Creek
12-Houses (Single) Keeney's Creek
1-Stable
1-House
Side Tracks and Inclines and Tramways
Merchandise and Fixtures in Store

Appendix II

NUTTALLBURG COAL PRODUCTION 1883-1958
(Tons 2,000 lbs)

YEAR	1ST 6 MO	2ND 6 MO	TOTAL	FAYETTE CO	W.VIRGINIA
1870				-	608,878
1871				-	618,830
1872				-	700,000
1873	**Nuttallburg Mine Opens/C&O Finished**				672,000
1874	**First Year C&O Opened**				**1,120,000**
1883	-	-	46,552	-	3,142,233
	No Production Data For The Years 1884-1896				
1897	44,911	42,430	87,341	3,352,228	13,110,528
1898	40,228	38,100	79,224	4,435,498	15,931,849
1899	41,276	39,271	80,574	4,980,045	18,200,168
1900	14,549	17,726	32,275	5,092,642	21,153,340
1901	27,841	36,285	64,126	6,020,786	22,724,801
1902	30,735	26,584	57,319	6,411,868	26,162,173
1903	9,295	46,472	55,767	4,564,363	25,663,342
1904	15,355	20,335	35,690	6,328,243	30,222,881
1905	20,888	22,643	43,531	7,546,944	35,283,392
1906	16,503	21,474	37,977	8,540,940	41,891,891
1907	18,847	23,046	41,894	8,150,573	38,125,148
1908	19,927	38,546	58,473	7,673,424	44,091,051
1909	32,870	36,307	69,076	8,509,477	45,577,018
1910	19,361	24,911	44,272	10,516,327	59,274,553
1911	24,549	27,031	51,580	10,101,722	60,517,168
1912	23,746	25,833	49,579	9,869,505	66,731,587
1913	30,238	30,180	60,417	10,169,440	69,182,794
1914	23,183	21,830	45,013	9,729,427	73,677,059
1915	23,694	33,832	57,525	8,827,697	71,812,918
1916	32,901	33,599	66,500	11,611,606	89,165,774
1917	30,399	27,092	57,491	10,702,180	89,383,450
1918	27,303	26,001	53,304	9,887,459	90,766,637
1919	26,880	27,199	54,079	9,030,549	84,9805523
1920	13,785	13,048	26,833	9,752,973	89,590,271
1921	27,240	23,692	50,932	9,842,260	90,452,996
1922	**Nuttallburg Mine Closed**			5,795,423	79,394,786
1923	-	10,665	10,665	9,284,255	97,475,177
1924	50,903	40,239	91,142	8,502,126	103,325,960
1925	70,945	169,875	240,820	14,888,267	176,306,656
1926	-	-	175,443	12,638,435	144,603,574
1927	-	-	187,268	12,666,435	146,088,121
1928	-	-	58,153	12,528,903	133,866,587
1929	-	-	171,125	13,034,029	139,297,146
1930	-	-	163,284	11,766,331	122,429,767

YEAR	1ST 6 MO	2ND 6 MO	TOTAL	FAYETTE CO	W.VIRGINIA
1931	-	-	111,415	10,840,689	102,608,420
1932	-	-	49,549	9,397,277	86,114,506
1933	-	-	42,616	9,993,035	94,130,508
1934	-	-	87,966	11,211,243	98,441,233
1935	-	-	112,846	11,329,307	99,810,908
1936	-	-	128,954	12,985,036	118,131,202
1937	-	-	93,787	12,851,148	118,965,066
1938	-	-	63,705	11,040,228	93,511,099
1939	-	-	89,125	11,076,244	108,515,665
1940	-	-	48,503	12,476,296	126,619,825
1941	-	-	123,519	13,253,414	140,944,744
1942	-	-	115,194	13,825,055	156,752,598
1943	-	-	119,895	13,885,684	160,429,576
1944	-	-	102,128	13,873,998	164,954,218
1945	-	-	67,096	12,573,940	151,909,714
1946	-	-	62,138	12,229,011	143,977,874
1947	-	-	72,047	15,171,500	173,653,816
1948	-	-	69,273	14,027,646	168,589,033
1949	-	-	49,164	10,158,544	122,913,540
1950	-	-	58,793	11,131,109	145,563,295
1951	-	-	75,631	12,419,992	163,418,001
1952	-	-	55,411	10,452,862	142,181,271
1953	**Nuttallburg Mine Closed**			8,080,750	131,872,563
1954	-	-	25,469	5,775,495	113,039,046
1955	-	-	11,739	7,253,158	137,037,372
1956	-	-	17,708	7,555,490	150,401,233
1957	-	-	14,107	6,569,359	150,220,548
1958	-	-	4,702	4,580,217	115,245,791
1959	**Nuttallburg Mine Closed**			4,462,768	117,770,002
1960	**Permanently**			4,402,741	120,107,994

Statistics from West Virginia Department of Mines Annual Reports for the years 1883 and 1895 to 1960. 1870-74 statistics from 1958 Annual Report.

The statistics for the year 1883, 1895 to 1924 have been adjusted to be consistent with the 1925 to 1960 statistics and are in tons (2,000 lbs) rather than in long tons (2,240 lbs), as they were reported in for those years.
1925 statistics are for six quarters. After 1926, only annual tonnage was reported.
The 1870-74 and 1959-60 statistics are included for comparison and are indicative of the rise and decline of the New River Field.

Appendix III

NUTTALLBURG COKE PRODUCTION
(TONS 2,240 lbs)

YEAR	1ST 6 MON	2ND 6 MON	TOTAL	NO OVENS	DAYS OPER
1883	-	-	15,378	51	-
1897	10,578	6,070	16,648	84	200
1898	9,200	9,200	18,400	-	-
1899	9,448	8,400	17,848	72/60	300
1900	-	-	10,603	72/39	268
1901	4,346	4,956	9,302	72/48	365
1902	-	-	-	72/0	0
1903	-	3,500	3,500	72/35	150
1904	-	-	-	85/0	0
1905	-	1,371	1,371	85/30	-
1906	-	-	-	85/0	0
1907	-	-	-	85/0	0
1908	1,344	1,095	2,439	85/50	-
1909	-	-	-	-	-
1910	-	750	750	52/14	90
1911	3,500	5,400	8,900	75/50	240
1912	3,390	-	3,390	50/50	130
1913	2,750	3,750	6,500	50/42	220
1914	4,044	3,030	7,074	50/39	280
1915	-	-	-	50/0	0
1916	778	7,207	7,985	65/46	140
1917	4,624	4,285	8,909	50/40	120
1918	4,375	4,357	8,732	50/50	-
1919	5,344	2,527	7,871	50/50	50
1920	**End of Nuttallburg Coke Production**				

Statistics from 1883 and 1895 to 1920 West Virginia Department of Mines Annual Reports.
Days Oper=The number of days in the year the coke ovens were in blast.

Appendix IV

FORD ERA PRODUCTION
NUTTALLBURG MINE vs TWIN BRANCH MINES
(Tons 2,000 lbs)

	NUTTALLBURG	TWIN BRANCH
YEAR	TOTAL	TOTAL
1923	10,665	228,165
1924	91,142	243,225
1925	240,820	423,856
1926	175,443	319,297
1927	187,268	331,454
1928	58,153	443,929

Twin Branch Mine No. 1, 2, 3, 4, & 5 were located in McDowell County, West Virginia in the Pocahontas Field. Tonnage reported are the combined production of Mine's No. 1, 2, 3, 4, & 5.

The 1923-24 figures have been adjusted to tons to be consistent.

Appendix V

NUTTALLBURG EMPLOYMENT STATISTICS

YEAR	INSIDE EMP	OUTSIDE EMP	COKE WORKERS	SUPERVR	TOTAL EMP	DAYS OPER
1883	61	20	-	-	81	-
	No Production Data For The Years 1884-1895					
1896	132	18	30	-	180	-
1897	160	17	45	-	205	212
1898	**No Employment Statistics Reported**					
1899	85	10	18	-	103	220
1900	87	16	22	-	125	210
1901	81	9	14	-	104	226
1902	81	8	-	-	89	230
1903	119	9	15	-	143	180
1904	74	8	-	-	82	186
1905	53	7	7	-	67	180
1906	57	7	-	-	64	206
1907	65	7	-	-	72	203
1908	78	8	10	-	96	212
1909	106	10	-	-	116	179
1910	50	10	5	-	65	240
1911	74	-	-	-	74	240
1912	73	12	15	-	100	240
1913	71	13	11	-	95	275
1914	61	11	9	-	81	253
1915	79	11	-	-	90	241
1916	60	10	12	-	82	264
1917	71	26	20	-	117	114
1918	55	21	-	-	76	240
1919	60	7	2	-	69	270
1920	45	8	-	-	53	121
1921	82	13	-	-	95	202
1922	**mine closed**					
1923	99	26	-	-	125	52
1924	113	17	-	-	130	167
1925	170	15	-	-	185	279
1926	189	30	-	-	219	255
1927	198	30	-	-	228	262
1928	142	10	-	-	152	267
1929	**From 1929 to 1934 Employment Statistics**					
1930	**Were Reported by County and Not By Mine**					
1931						
1932						
1933						
1934						

YEAR	INSIDE EMP	OUTSIDE EMP	COKE WORKERS	SUPERVR	TOTAL EMP	DAYS OPER
1935				-	134	194
1936	170	11	-	-	181	215
1937	160	13	-	-	173	152
1938	83	9	-	-	92	154
1939	110	12	-	-	122	189
1940	94	11	-	-	105	113
1941	121	10	-	-	131	224
1942	114	12	-	-	126	241
1943	89	10	-	5	104	286
1944	74	10	-	3	87	296
1945	53	9	-	4	66	285
1946	50	8	-	4	62	240
1947	65	8	-	5	80	265
1948	67	11	-	5	83	239
1949	69	10	-	4	83	163
1950	72	10	-	6	88	183
1951	72	10	-	7	89	237
1952	81	10	-	7	98	175
1953	**Mine Closed**					
1954	**No Employment Statistics Reported**					
1955	28	2	-	3	33	87
1956	26	3	-	3	32	130
1957	22	3	-	3	28	95
1958	22	2	-	2	26	56

Employment Statistics from the West Virginia Department of Mines Annual Reports for 1883 and 1895 to 1958.
Production of coke at Nuttallburg ceased after 1920.
Days Oper=the number of days the mine operated

Appendix VI

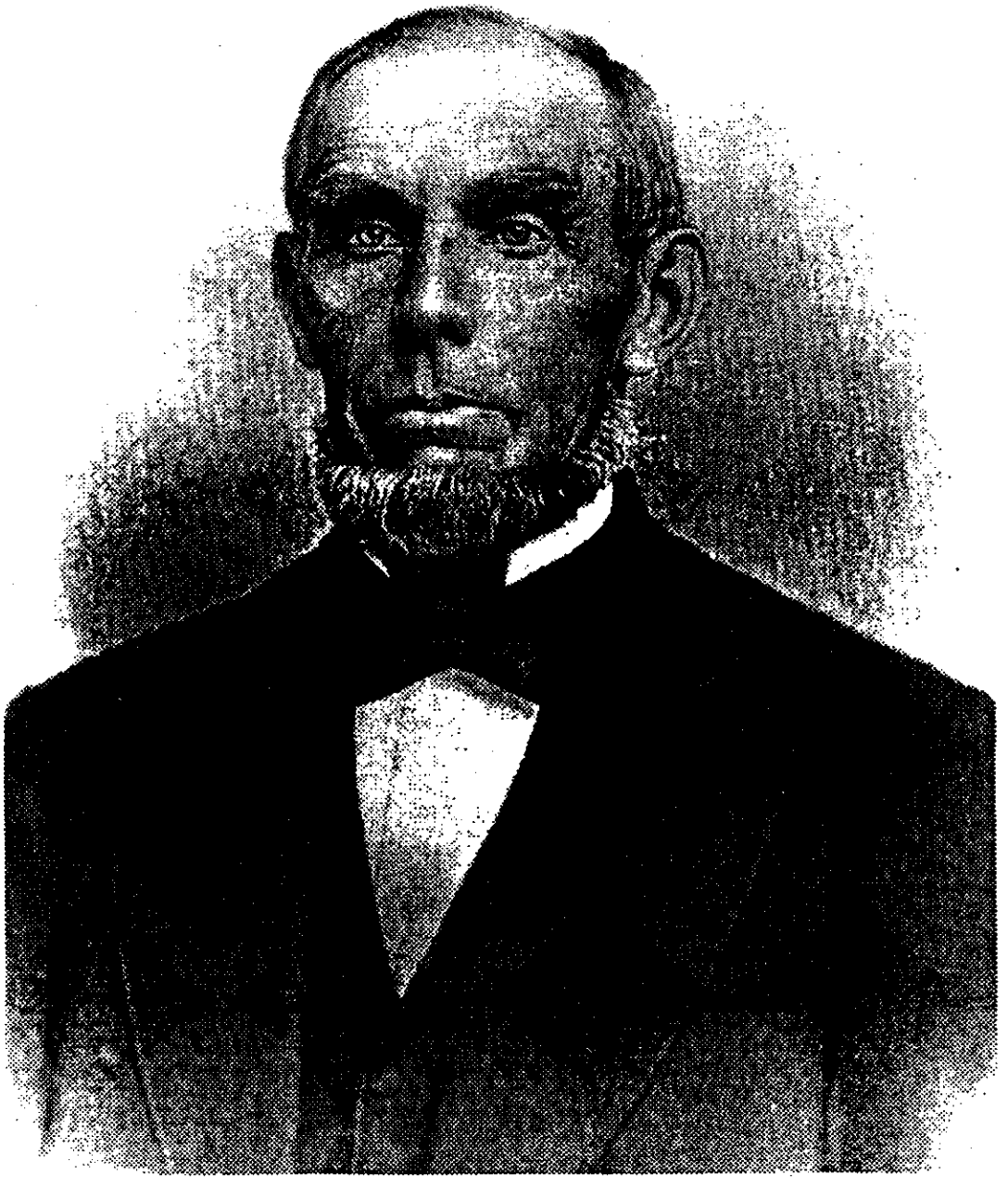
PICK PRODUCTION VERSUS MACHINE PRODUCTION
(Tons 2,000 lbs)

YEAR	TOTAL PICK	No. PICK MINERS	TOTAL MACH	No. MACHS	No. MACH MINERS
1901	57,784	45	6,341	2	12
1902	48,304	45	9,015	2	10
1903	47,340	75	8,427	2	10
1904	17,845	30	17,845	2	20
1905	41,182	37	2,349	2	3
1906	33,356	30	4,621	2	10
1907	27,383	30	14,511	3	20
1908	29,236	35	29,236	4	25
1909	47,229	60	21,948	4	25
1910	14,757	15	29,515	4	16
1911	20,633	16	30,948	4	20
1912	23,668	21	25,911	2	18
1913	13,589	20	46,828	5	29
1914	15,300	15	29,712	5	25
1915	24,881	24	32,645	6	28
1916	23,122	23	34,379	6	11
1917	21,280	28	36,211	6	12
1918	17,395	6	35,909	5	20
1919	2,704	5	51,376	5	32
1920	**No Pick Mining Reported**		26,833	3	23
1921	**1920-23**		50,932	4	42
1922			**mine closed**		
1923			10,665	7	54
1924	385	-	90,757	9	63
1925	17,880	16	151,995	7	70
1926	43,860	14	131,583		81
1927	-	12	187,268		80
1928	1,153	10	58,153		90
1929*	3,359		167,766		
1930	1,821		161,463		
1931	1,217		110,198		
1932	475		49,074		
1933	447		42,169		
1934	1,592		86,374		
1935	2,348		110,498		
1936	**the apparent end of pick mining at Nuttallburg**				

Statistics from the West Virginia Department of Mines Annual Reports for the years 1901 to 1936.
* No individual mine employment statistics reported for the years 1929 to 1935.
No. Pick Miners=the number of pick miners employed.

No. Mach=the number mining machines employed at the mine.
No. Mach Miners=the number of mining machine operators.

Appendix VII:
Historic Photographs



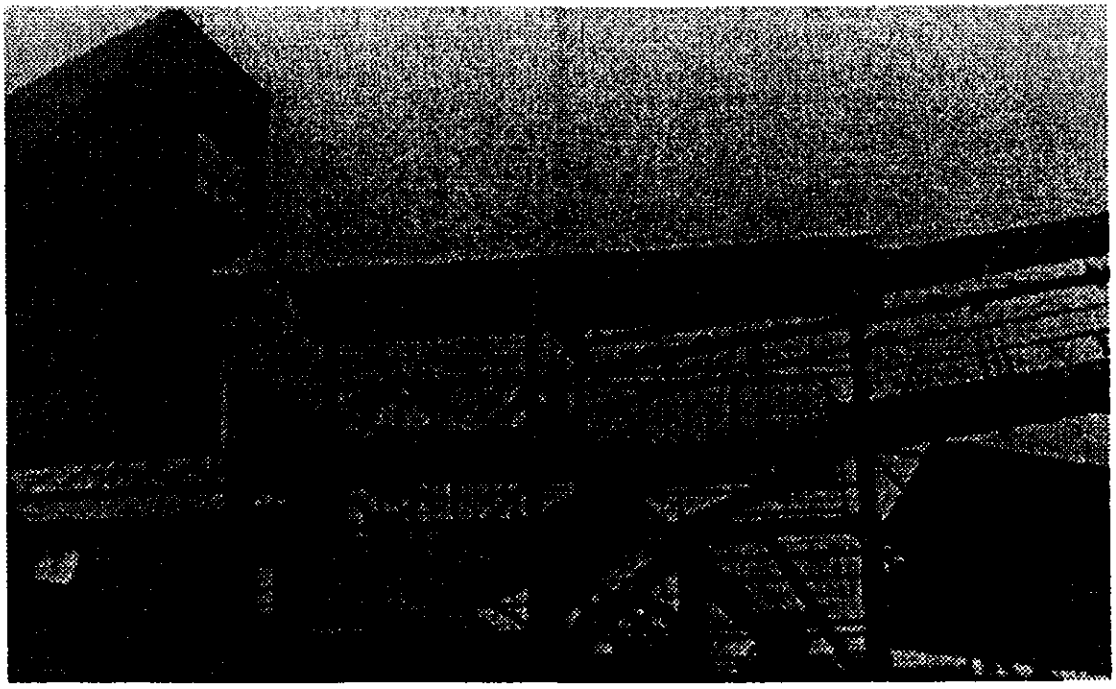
Photograph No. 1
John Nuttall (1819-1897)
(Institute for the History of Technology
and Industry Archaeology (IHTIA))

Photograph No. 82
Nuttallburg Smokeless Fuel Company Tipple, ca1919
(IHTIA)

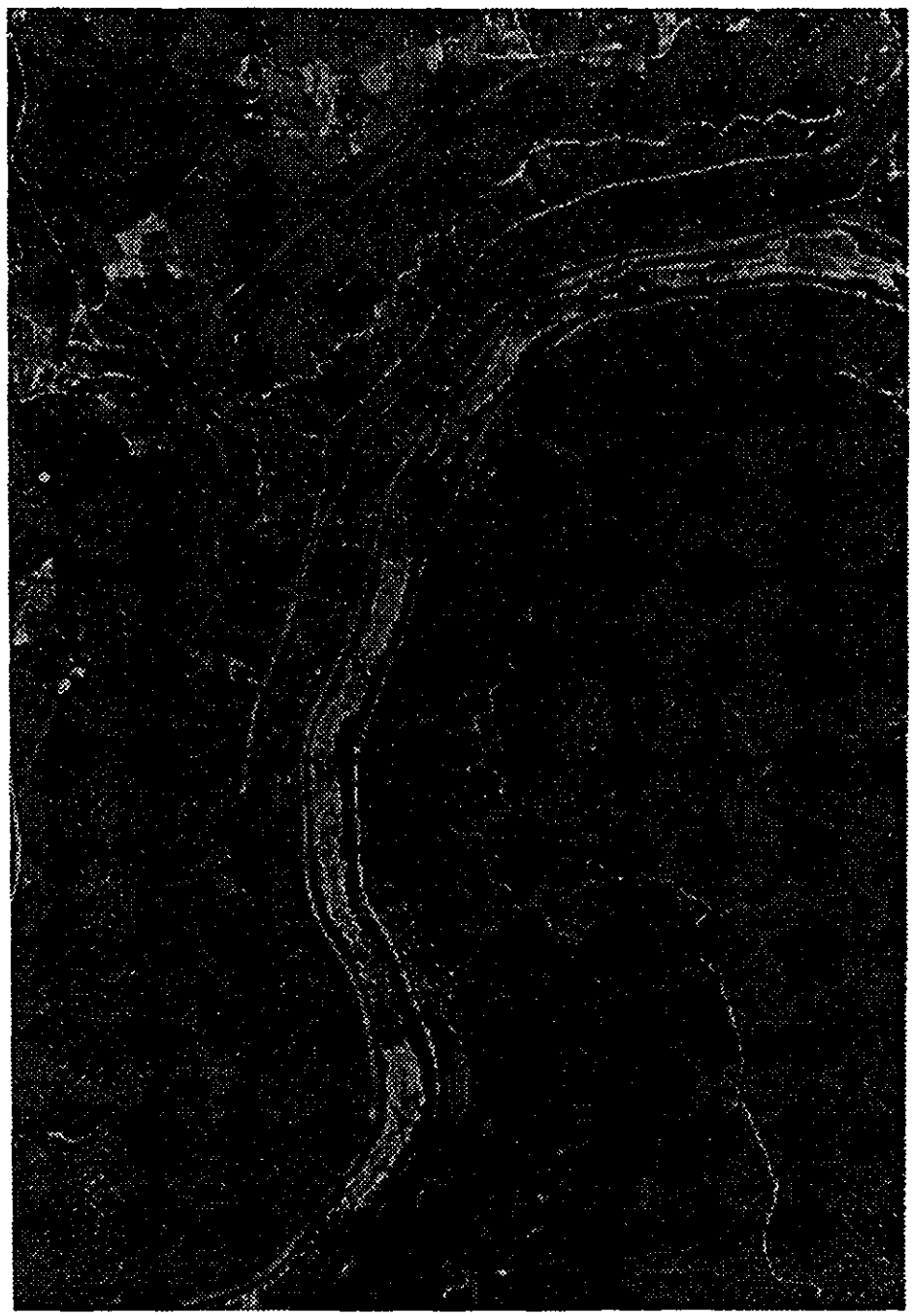
Photograph No. 13
Original Nuttall Headhouse, ca1925
(IHTIA)

Photograph No. 104
Steel Headhouse under construction, ca1925
Note: Monitor Drum and Conveyor Drive Sprocket
(IHTIA)

Photograph No. 15
Completed Steel Headhouse, ca1927
(IHTIA)



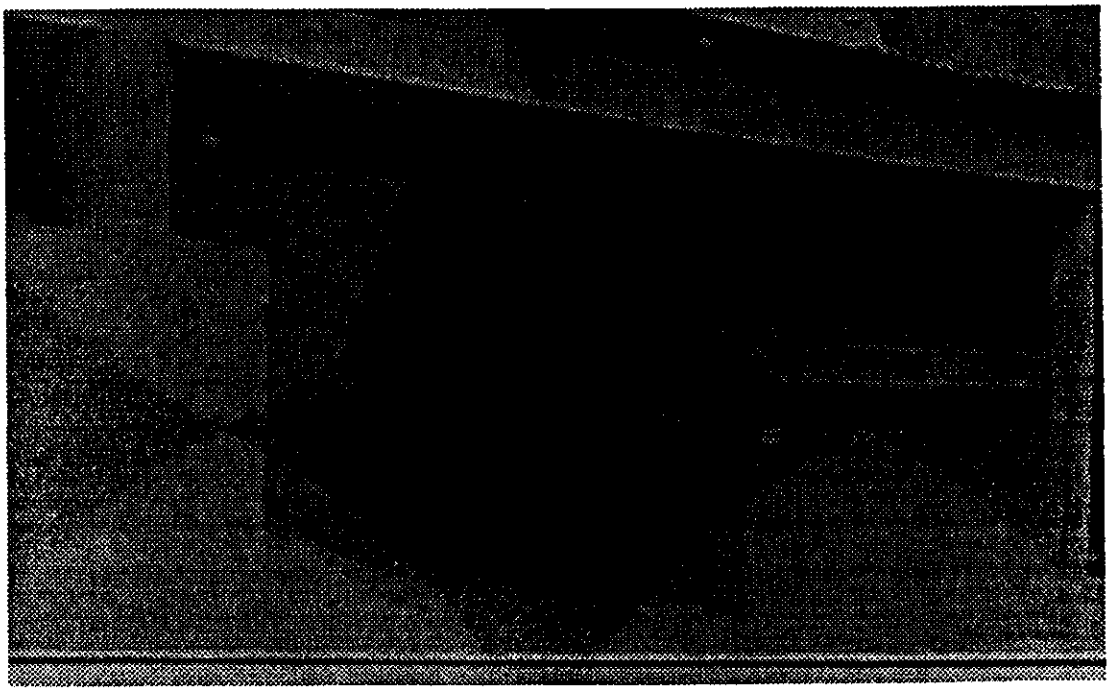
Photograph No. 12-6
Conveyor House under construction, ca1925
(IHTIA)



Photograph No. N 7
Aerial View of Nuttallburg and New River Gorge, 1957
Note: Conveyor at left center and Keeneys Creek Branch paralleling the river
(IHTIA)

Photograph No. 18
Loaded trip and miners exiting main mine portal, ca1927
(IHTIA)

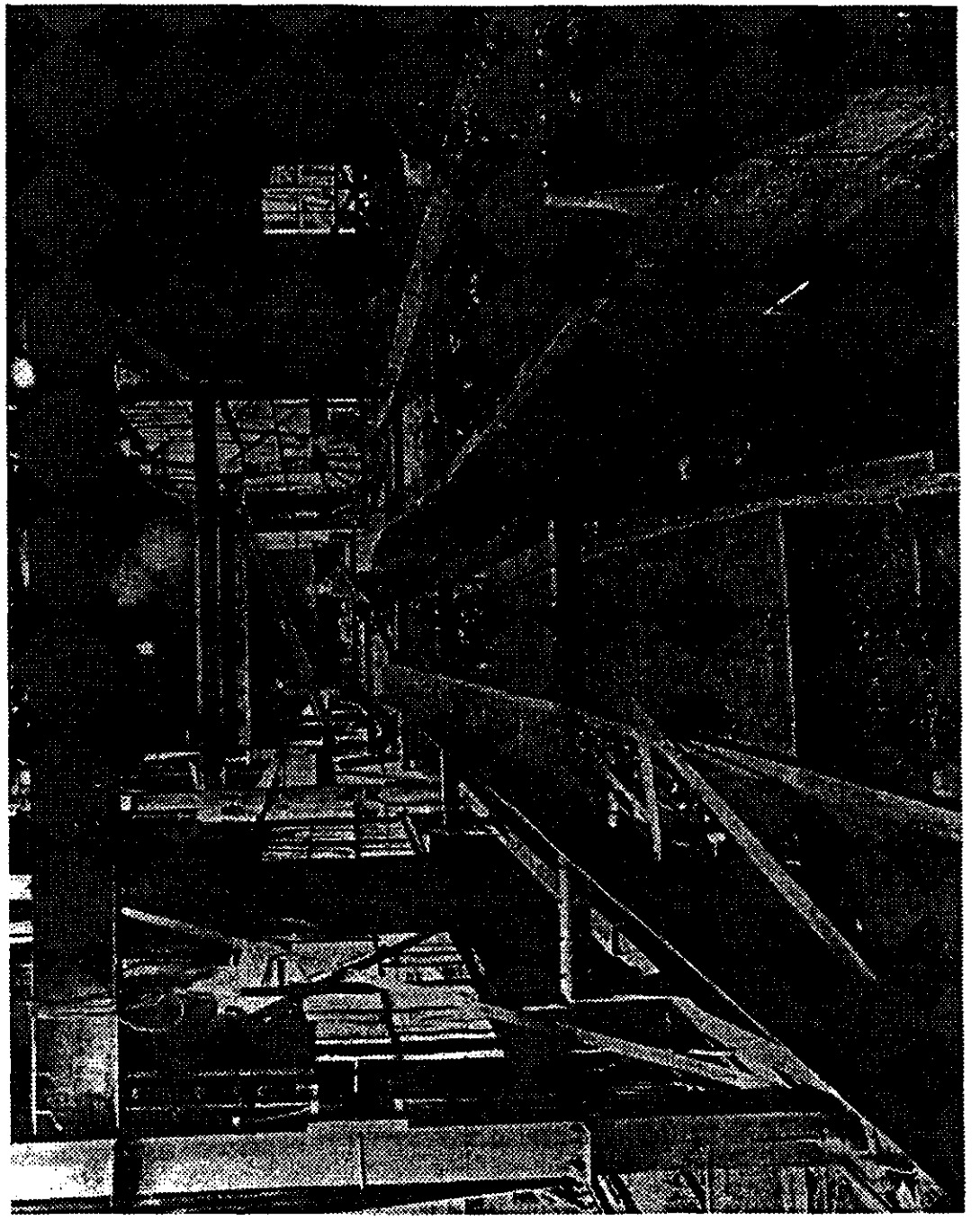
Photograph No. 29
Interior view of outside Substation, ca1927
Note: dynamo and control panel
(IHTIA)



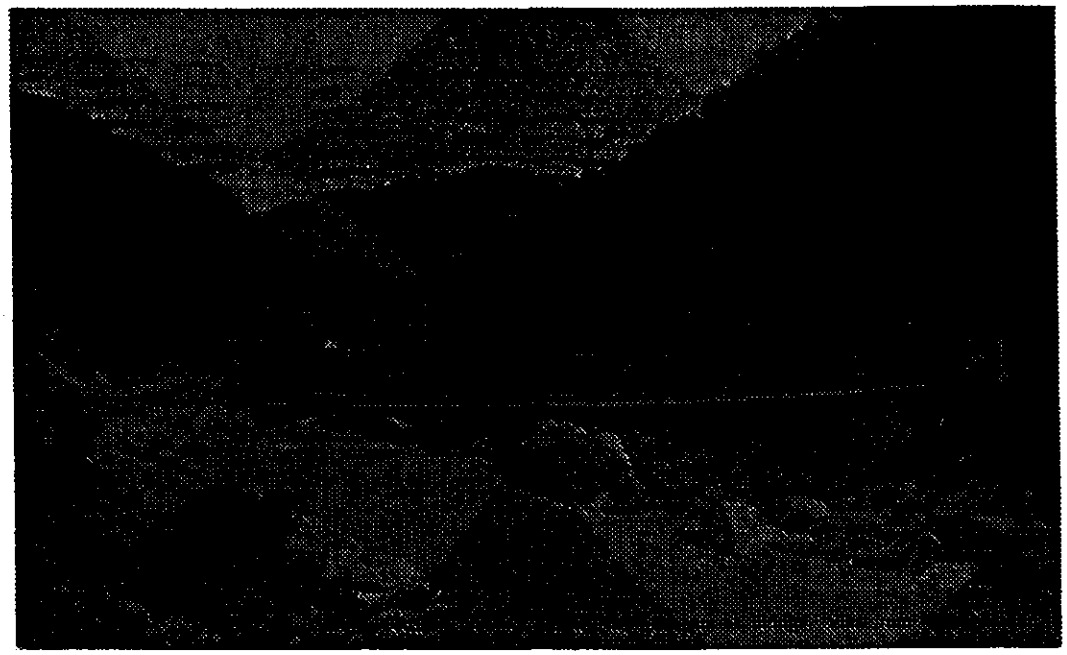
Photograph No. ~~30~~ 10
Sandhouse on bench level, ca1927
(IHTIA)

Photograph No. 21 11
Fordson Coal Company Fan House, ca1926
(IHTIA)

Photograph No. 22.12
Typical Roberts and Schaefer Screening Room
Note: Skylights used to illuminate Picking Table
(IHTIA)



Photograph No. ~~2~~ 3
Typical Marcus Screening Tables
Note: Refuse Trough above table
(IHTIA)



Photograph No. ~~25~~ 14
Postcard view of Nuttallburg Suspension Bridge, ca1911
(IHTIA)

Appendix VIII:
Illustrations

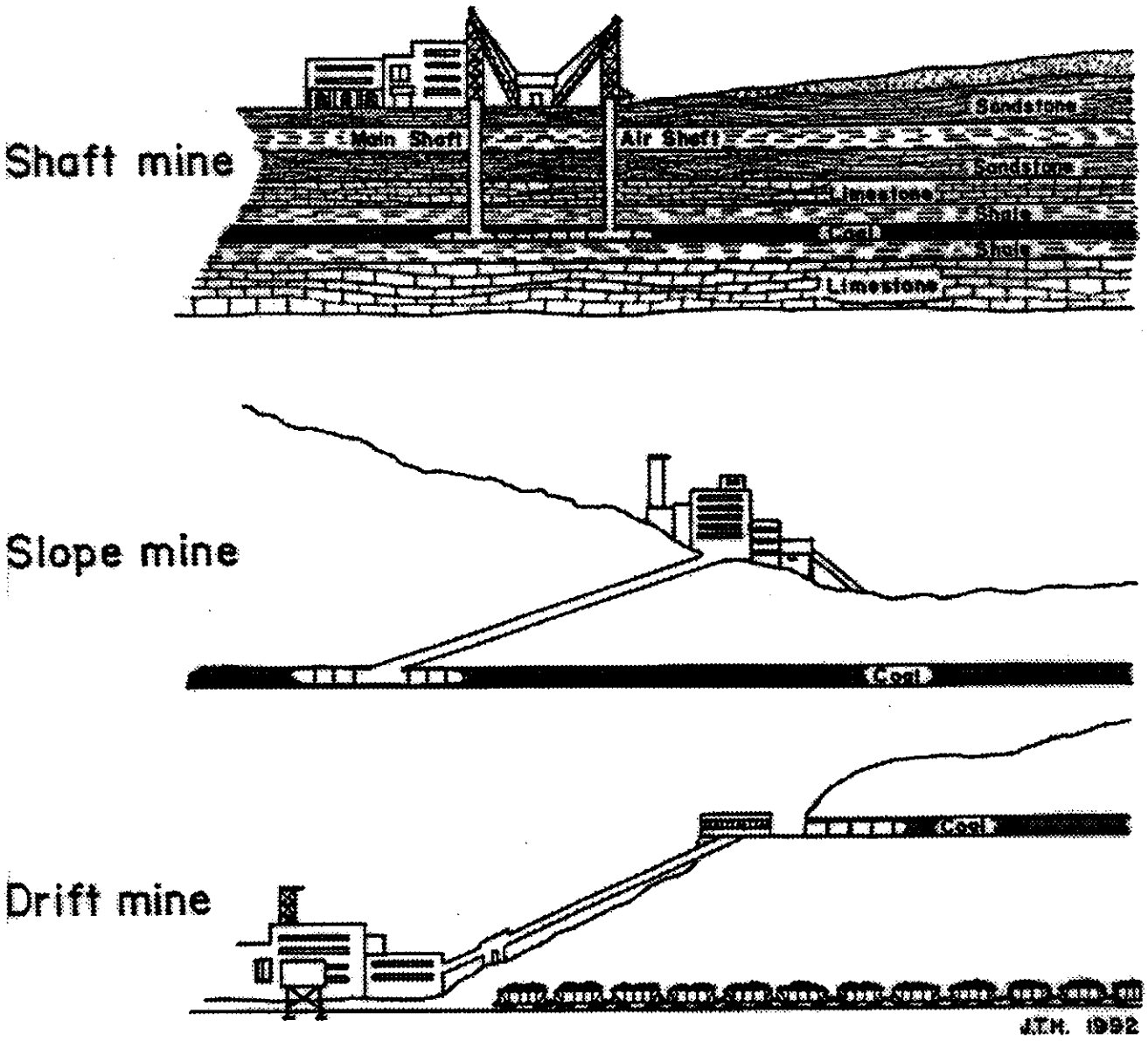


Illustration No. 1
Types of coal mines
(Delineated by John Hriblan)

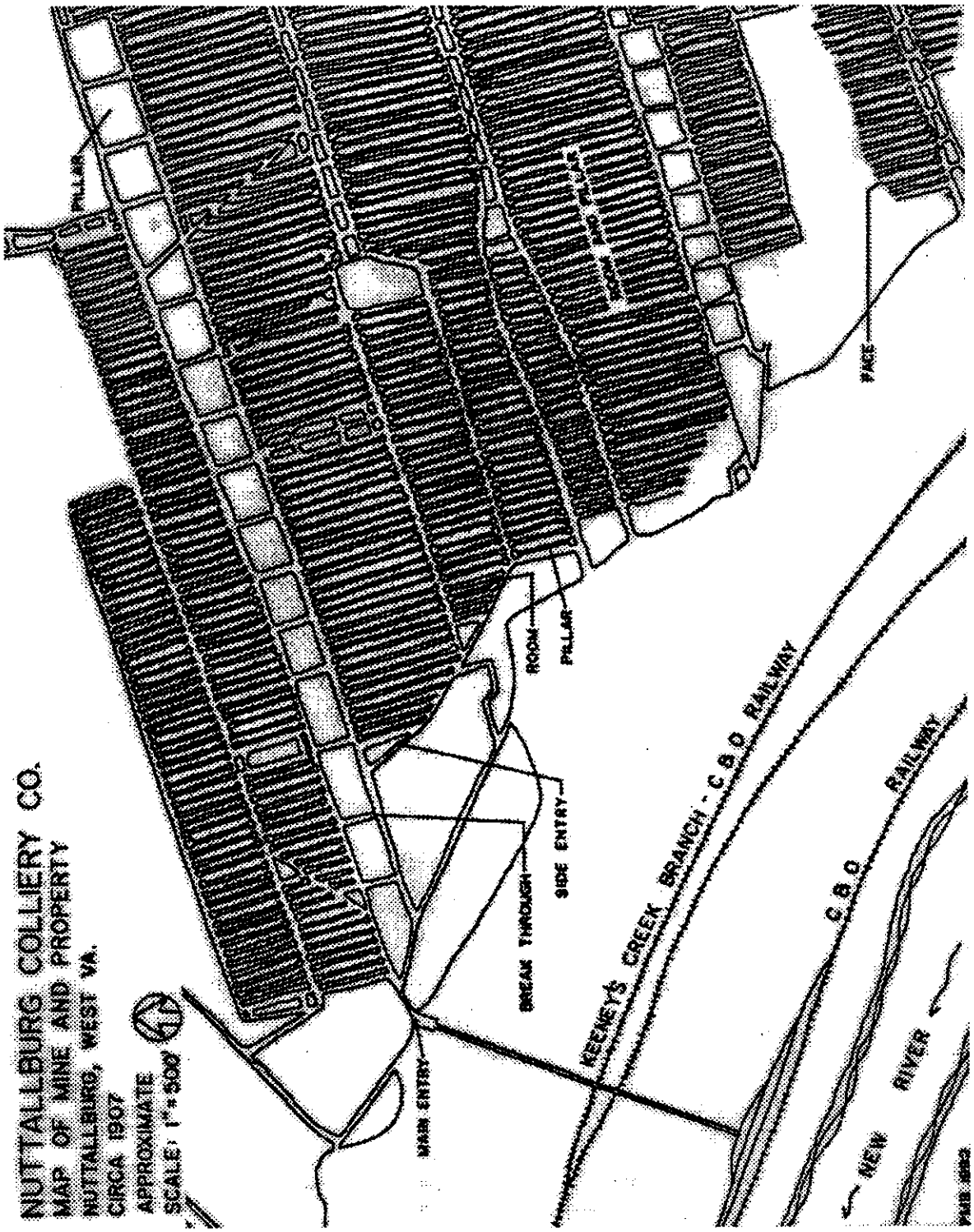


Illustration No. 2
Mine Workings at Nuttallburg, ca1907
(From Nuttallburg mine map, delineated by Paul Boxley)

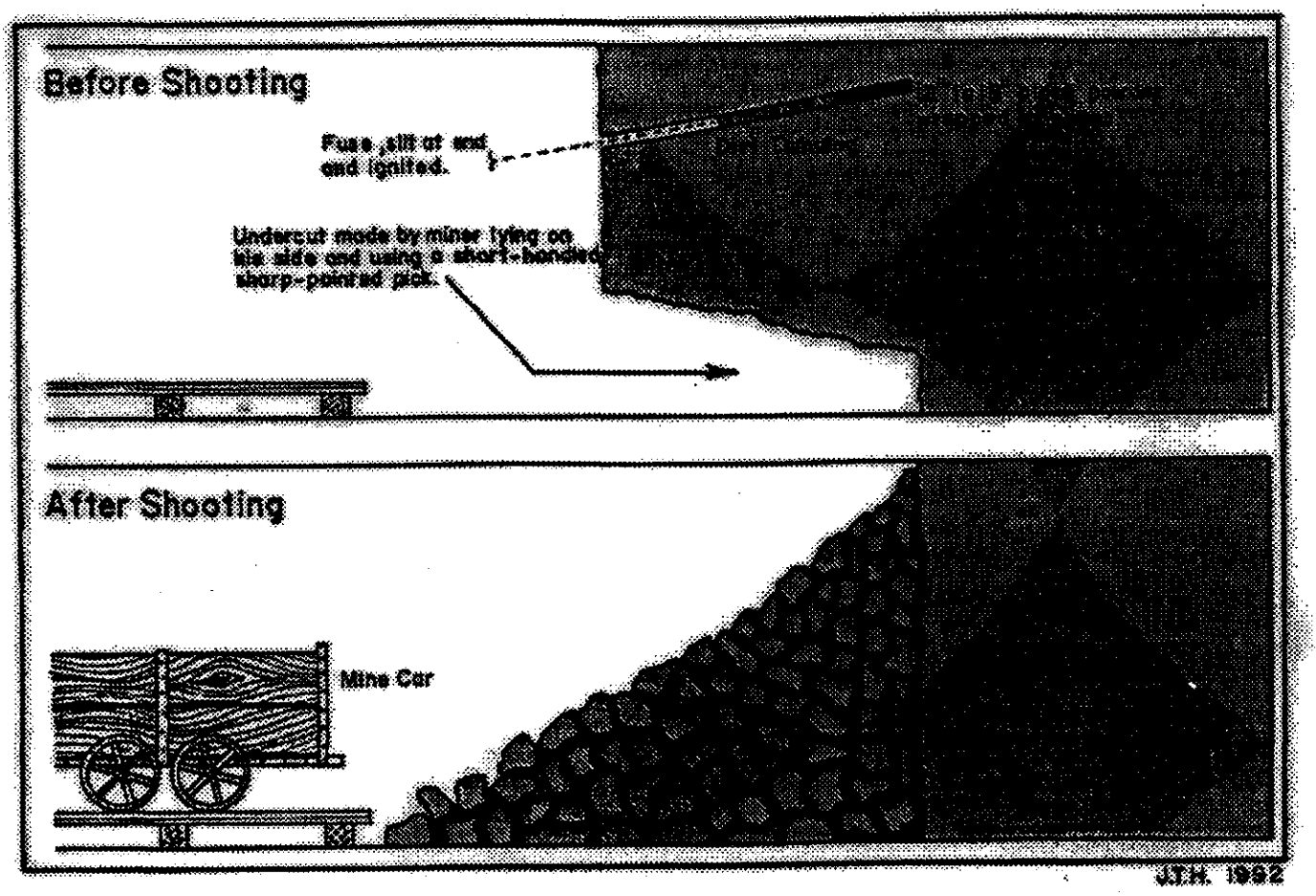


Illustration No. 3
Shooting Coal
(Delineated by John Hriblan)

Jeffrey Shortwall Mining Machine

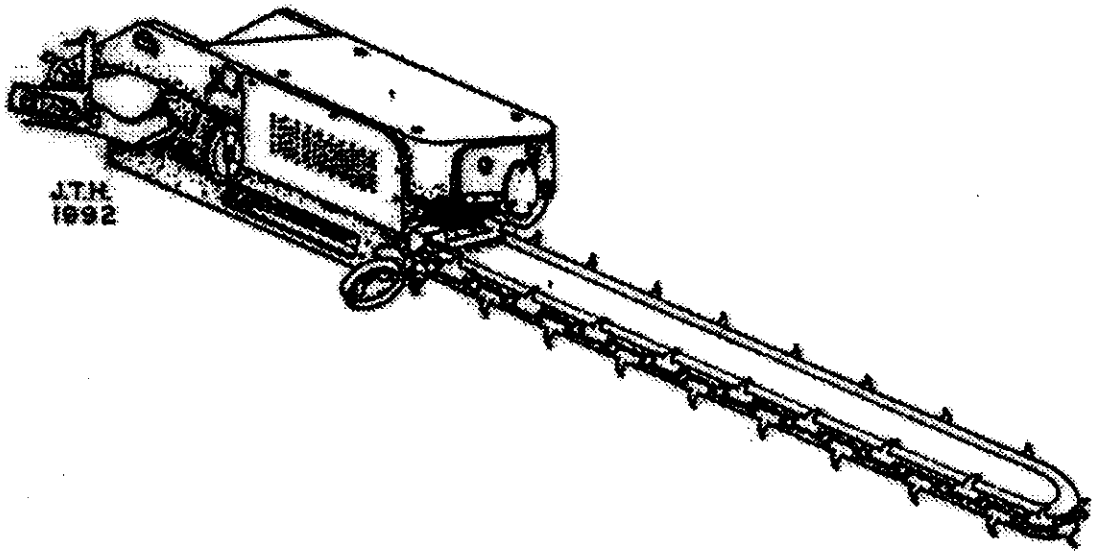


Illustration No. 4
Jeffrey Shortwall Mining Machine
(Delineated by John Hriblan)

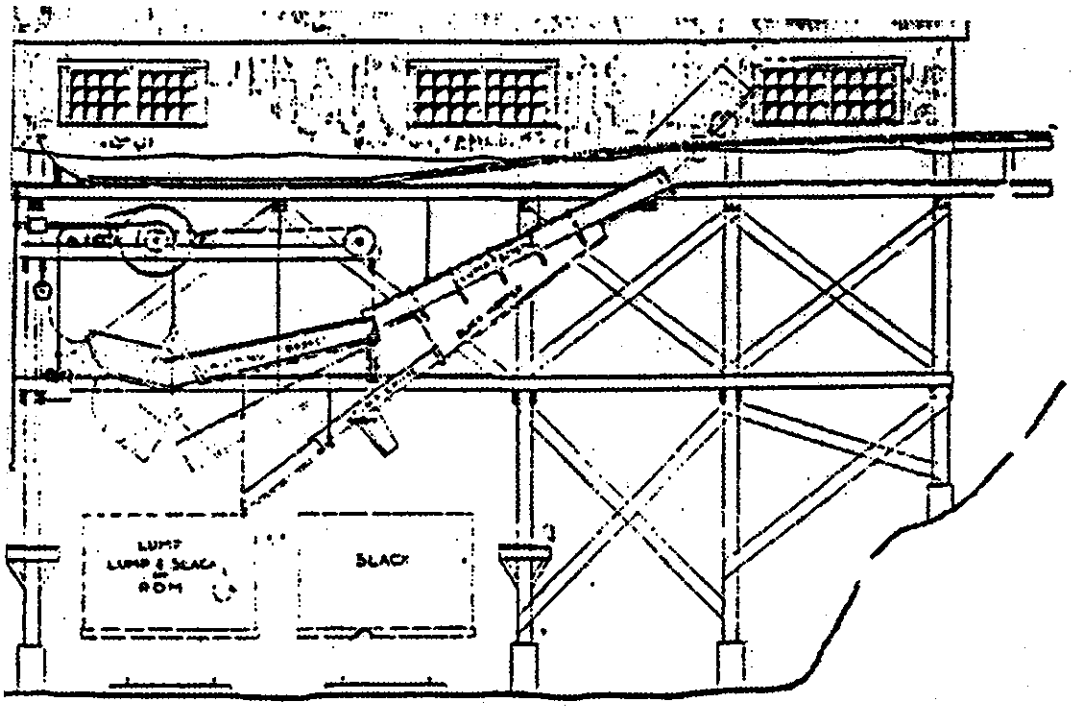


Illustration No. 5
Typical Gravity Screen Arrangement

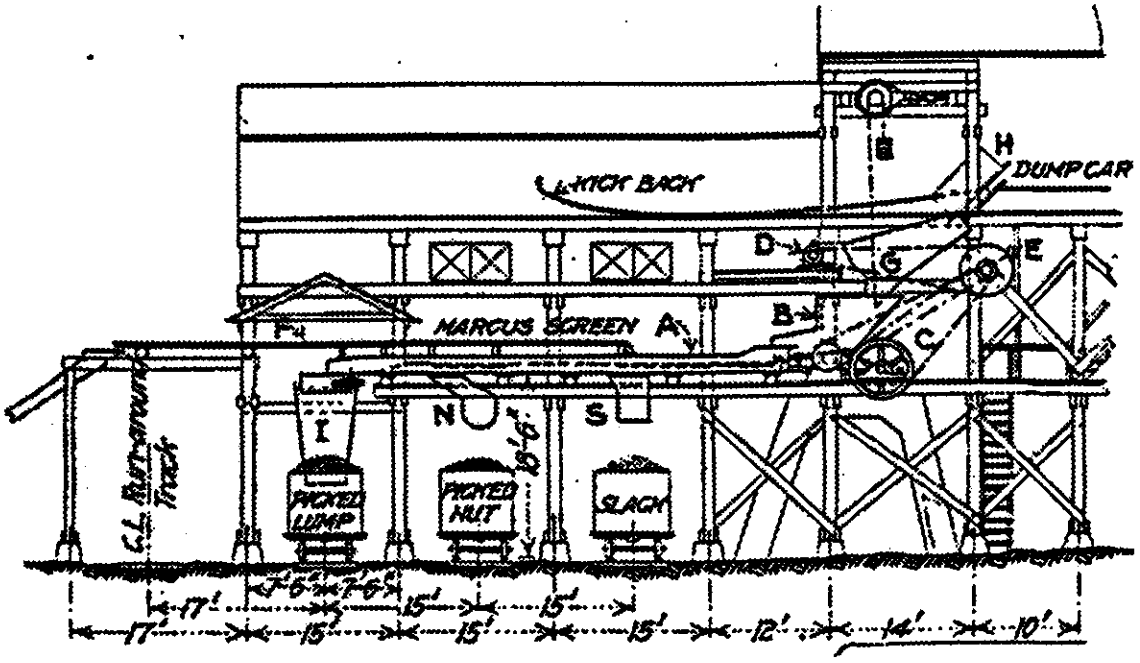


Illustration No. 6
Roberts and Schaefer Tipple with layout similar to the Nuttallburg Tipple, except dump car delivery rather than conveyor

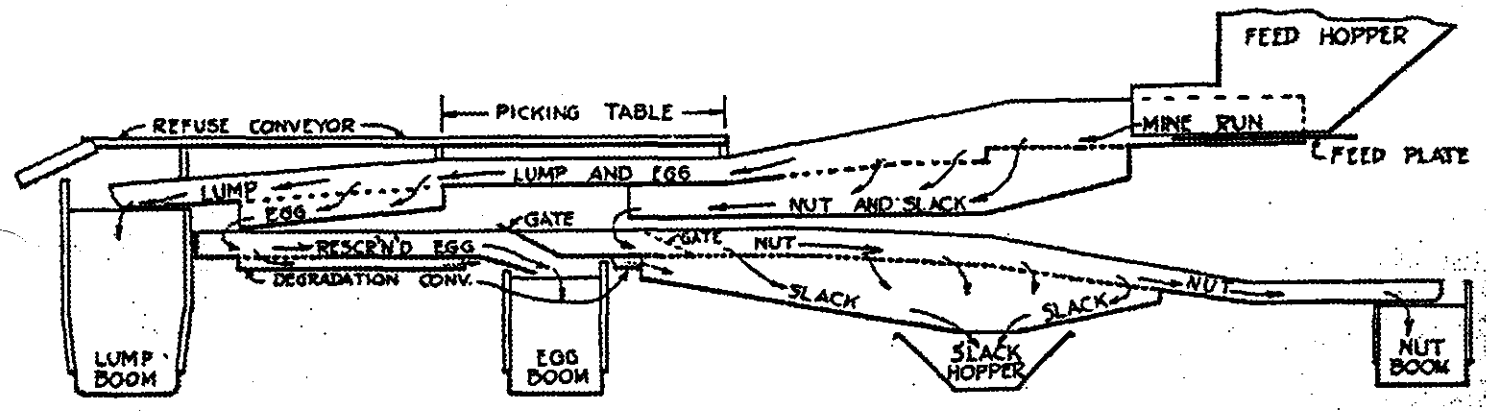


Illustration No. 7
Screen arrangement for Krehbiel Co. Double-Deck Coal Screen, very similar to the Marcus Picking Table Screen design

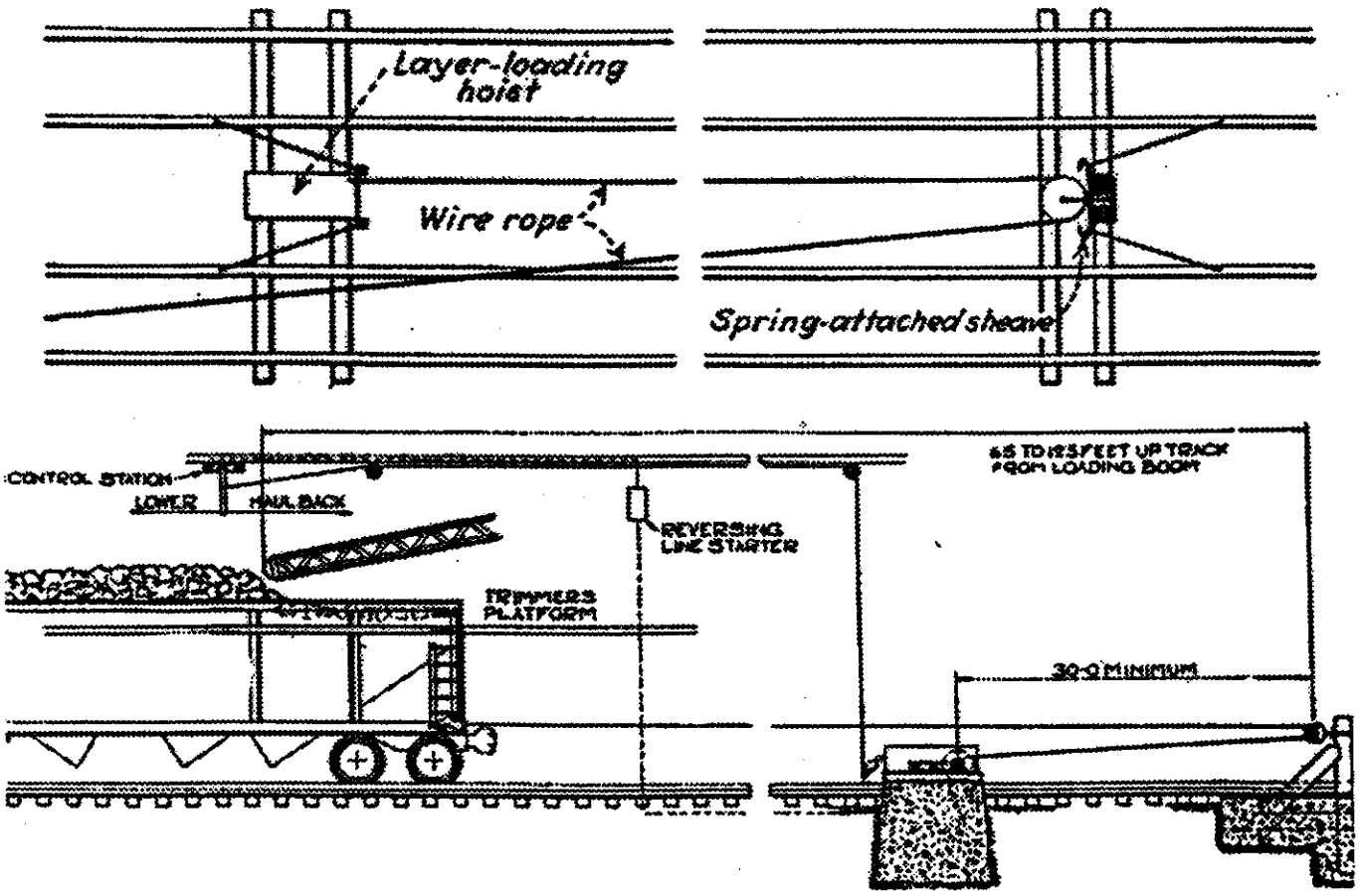


Illustration No. 8
Typical Layer Loading hoist
and pulley arrangement

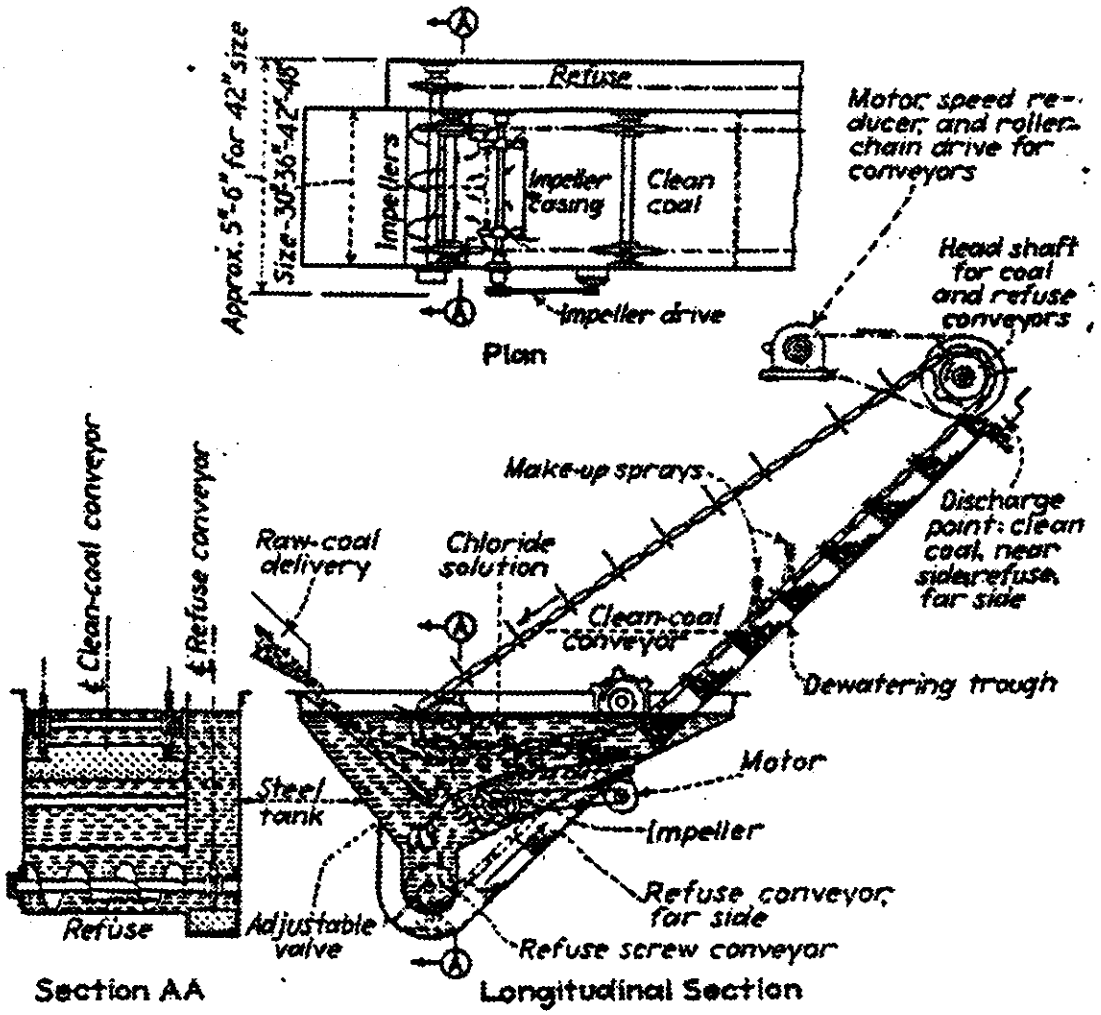


Illustration No. 9
Typical Belknap Chloride Washer
(From Coal Age)

ENDNOTES

1. I.C. White, et al, West Virginia Geological Survey: Fayette County (Wheeling, W.Va.: Wheeling News Litho Co., 1919), p.1, p.19.

2. Ibid, p. 19, p. 84.

3. Ibid, p. 42-43.

4. J. T. Peters and H. B. Carden, History of Fayette County, West Virginia (Charleston, W.Va.: Jarrett Printing Co., 1926), pp. 1-4.

5. Peters and Carden, Fayette County, p. 26.

6. Alan Vance Briceland, Westward from Virginia: The Exploration of the Virginia-Carolina Frontier, 1650-1710 (Charlottesville, VA: University Press of Virginia, 1987), pp. 124-146. This is an excellent re-examination of the early interpretations of the explorations of Virginia, West Virginia and the Carolina's and refutes many of these earlier interpretations. Wood, Batts, and Fallam are often credited with discovering the Falls of the Great Kanawha and other Fayette County features, but Briceland's book refutes these claims.

7. Otis K Rice, West Virginia: A History (Lexington, KY: University of Press Kentucky, 1985), pp. 19-20; and Peters and Carden, Fayette County, pp. 79-80.

8. Peters and Carden, Fayette County, pp. 80-82.; and Anthony F.C. Wallace, The Death and Rebirth of the Seneca (New York: Vintage Books, 1972), pp. 122-23.

9. Peters and Carden, Fayette County, pp. 85-99; and Helen Vogt, Westward of ye Laurall Hills 1750-1850 (Parsons, WV: McClain Printing Co., 1976), pp. 47-48.

10. Peters and Carden, Fayette County, pp. 4-5.

11. George Washington also proposed the construction of the Potomac Canal which ultimately became the Chesapeake and Ohio Canal. Washington spearheaded the construction of skirting canals around the Great Falls of the Potomac, at Harper's Ferry and other places with rapids in an attempt to improve navigation on the Potomac River. Today, remnants of this early canal can be found on the Virginia side of the Potomac River.

12.James J. Kirkwood, Waterway to the West (Washington, D.C.: Eastern National Park and Monument Association, 1963), pp. 6-15. The Richmond to Buchanan canal featured 37 miles of slack water, 23 feeder dams, 12 aqueducts, 198 culverts, 135 bridges (carrying roads over the canal), and 90 lift locks that over came 728 feet in elevation. The first 146 miles from Richmond to Lynchburg cost $39,982 per mile and $48,451 per mile from Lynchburg to Buchanan. See above pp. 14-15.

13.White, Fayette County, p. 16.

14.Indeed, the story of the Civil War in West Virginia can be traced to its system of turnpikes, with virtually all engagements occurring along the turnpikes and where the turnpikes passed through gaps, because of the ruggedness of the region. Additionally, railroad junctions and right of ways were also the scenes of much action in West Virginia.

15.Kirkwood, Waterways, p. 14.

16.Eugene L. Huddleston, Riding That New River Train (Alderson, WV: The Chesapeake and Ohio Historical Society, Inc.), pp. 11-13; and White, Fayette County, pp. 10-11.

17.Peters and Cardin, Fayette County, p. 252.

18.The Sewell seam is contained in the Pennsylvania Series of the Pottsville Formation and the New River Group. The general analysis of Sewell coal is: Moisture-0.75; Volatile Matter-19.90; Fixed Carbon-76.15; Ash-3.20; Sulfur-0.80; B.t.u.-15,130.

19.Peters and Cardin, Fayette County, pp. 252-53.

20.Peters and Cardin, Fayette County, pp. 253-257.

21.Joseph L. Buery was forced to leave the Pennsylvania fields due to trouble with the "Molly McGuires" who were trying to organize the Pennsylvania fields following the Civil War.

22.W.P. Tams, The Smokeless Coal Fields of West Virginia: A Brief History (Morgantown, WV: West Virginia University Foundation, 1983), pp. 78-79; and Peters and Carden, Fayette County, pp. 258-60.

23. A tierboy was probably responsible for tying threads broken during the thread making process. This was a very hazardous job that required the worker to climb under and around moving textile machinery. Waifs and orphans were often hired for this task.

24.John Nuttall, "The Life of John Nuttall" (New River Gorge National River: Unpublished Manuscript, nd), p. 1. New River Gorge National River Park Headquarters Library, Glen Jean, West Virginia.

25.Nuttall, "Nuttall", pp. 1-2.

26.George H. Burgess and Miles C. Kennedy, Centennial History of The Pennsylvania Railroad Company (Philadelphia: The Pennsylvania Railroad Co., 1949), pp. 111-12; and William B. Sipes, The Pennsylvania Railroad: Its Origin, Construction, Condition, and Connections (Philadelphia: The Passenger Department, 1875), pp. 209-11. Sipes book lists each stop of the Tyrone and Clearfield Railroad with a description and includes a Powelton.

27.In general, coal from the Kittanning (B) or "Miller" seam was mined in this region. Coal from the Miller seam is a low moisture and high fixed carbon coal, much like coal from the Sewell seam, and was used for both coking and as steam coal. See Blair County and Cambria County, Pa.: An Inventory of Historic Engineering and Industrial Sites.

28.Nuttall, "Nuttall," pp. 2-3. Powelton, Pennsylvania still exists today and is located in the southwest corner of Centre County. Powelton was sixteen miles from Tyrone via rail. See Sipes, Pennsylvania Railroad, p. 211 for a very short description of Powelton.

29.Moshonnan Creek flows north and is a tributary of the west branch of the Susquehanna River. Moshonnan Creek was the center of extensive mining activity during the nineteenth century and the early twentieth century. The Moshonnan bed was extensively mined during this period as it is high quality steam coal. See The Coal Catalog Combined With Coal Field Directory for the Year 1922 (Pittsburgh: Keystone Consolidated Publishing Co. Inc., 1922), p. 707.

30.Presumably these mines were located in Decatur Township, Clearfield County. Clearfield County maps indicate Little Laurel and Laurel runs, that are a tributary of Moshonnan Creek and are located in Decatur Township. Additionally, the 1922 Keystone Coal Field Directory lists a Laurel Run Coal Company in Clearfield County with a Laurel Run No. 1 Mine. See "Laurel Run Coal Company," Coal Field Directory for the Year 1922, pp. 822-23.

31.Nuttall, "Nuttall," pp. 3-4.

32.The literature does not indicate from where Nuttall departed on his journey to the Kanawha coal fields.

33.Nuttall, "Nuttall," pp. 4-5.

34.Nuttall, "Nuttall," p. 5.

35.Nuttall, "Nuttall," pp. 5-6.

36.Grantee Index to Deeds M,N,O: 1831-1926, Fayette County, West Virginia, p. 55.2. Fayette County Courthouse, Fayetteville, West Virginia.

37.Fayette County Deed Book G, p. 602.

38.There are some discrepancies about which mine opened first. The author believes the Keeney's Creek mine was opened first followed by the Nuttallburg Mine. However, the Nuttallburg Mine is often credited with opening first. The author's title research seems to indicate that the Keeney's Creek mine was opened first and this research is what the author bases his conclusions on. To further confuse the issue, the mines were known collectively as the Nuttallburg Mine during their early years of operation.

39.John Nuttall, Trees Above, with Coal Below (San Diego: Neyenesch Printers, 1961), pp. 57-66.

40.Nuttall, "Nuttall," p. 7.

41.Nuttall, "Nuttall," pp. 7-8.

42.Huddleson, Riding, p. 74.; and Everett Young, "Tracking C&O's Past: A Trip Down Keeney's Creek," C&O Historical Newsletter, January 1979. This branch line went out of service in the early 1960s and the track was taken up in the early 1970s. The right-of-way of this branch is still used by local sportsman to reach the New River at Nuttallburg, and the recording team traversed it many times to record the Nuttallburg Tipple during the summer of 1991.

43."How John Nuttall Developed the Keeney's Creek Section," The State Sentinel, 6 February 1952, p. 4; and Nuttall, "Nuttall," pp. 8-9.

44.Fayette County Deed Book 27, p. 58-60. The Fayette County court records do not list any articles of incorporation for the Nuttallburg Coal and Coke Company, a corporation, so it was probably incorporated in Kanawha County.

45.Fayette County Deed Book 33, pp. 526-28.

46.William Deegans, a native Ohioan, was a renown West Virginia capitalist with a long and distinguished career in the coal mining industry. Deegans came to Fayette County in 1895 to work for the C&O Railroad. By 1900, Deegans was in the general mercantile business. In 1908, Deegans helped organize the Pocahontas

Smokeless Coal Company at Welch, West Virginia. This was the first of many coal concerns organized by Deegans, which included the Nuttallburg Smokeless Fuel Company. See "William E. Deegans," in James Callahan, History of West Virginia: Old and New and West Virginia Biography, Vol II (Chicago: The American Historical Society, Inc., 1923), pp. 422-23.

47. Fayette County Deed Book 38, pp. 430-31.

48. Coal Age 10 (1912): 1057.

49. "Mining News," Fayette Tribune, 29 July 1920, p. 1. This author was unable to locate any deed transactions which document this acquisition, although it is common knowledge that the Ford interests purchased the mine.

50. Allan Nevins and Frank Ernest Hill, Ford: Expansion and Challenge, 1915-1933 (New York: Charles Scribner's Sons, 1957), pp. 214-26. Ford sold the D,T&I in 1928.

51. The Ford Industries: Facts About the Ford Motor Company and its Subsidiaries (Detroit: Ford Motor Company, 1924), p. 6.

52. "Charleston, W.Va.," Coal Age 19 (1918): 920. It is not clear if in fact Ford ever purchased this property.

53. "Henry Ford Visits His Nuttall Mine," Fayette Tribune, 20 October 1921.

54. "Ford Mines See Changes," Ford News 1 July 1923, p. 1.

55. "West Virginia," Coal Age 17(1922): 699.

56. "West Virginia," Coal Age 18(1922): 741. The Keeney's Creek Collieries Company was sold to the Maryland New River Company in the spring of 1917. See Coal Age, 14 April 1917, p. 686.

57. "West Virginia," Coal Age 21(1922): 861.

58. "West Virginia," Coal Age 26(1922): 1062. In the same Coal Age notice, stated that a new opening was to be driven on Keeney's Creek and a new tipple constructed there, however this must relate to Maryland New River's operation of the Keeney's Creek mine and not the Nuttallburg Mine.

59. "West Virginia," Coal Age 20(1922): 821. Additionally, Ford purchased coal property at Pond Creek in Pike County, Kentucky in early 1923. See Coal Age 4 January 1923.

60."Ford Founds a $15,000,000 Coal Company," The New York Times, 10 February 1923, p. 1; and "Ford Organizes $15,000,000 Coal Company," Coal Age 4 (1923): 309.

61."West Virginia," Coal Age 6 (1923): 281.

62."West Virginia," Coal Age 19 (1923): 725; and Coal Age 25 (1924): 339. The equipment installed at the Twin Branch tipple was identical to that of the Roberts and Schaefer equipment installed at Nuttallburg, i.e., Marcus screens and RandS loading booms. Ironically, the Twin Branch mine also had a retarding conveyor installed, a harbinger of things to come at Nuttallburg. see Coal Age 26 (1924): 636.

63.Roberts and Schaefer Company confirmed that this type of equipment was installed at the Nuttallburg tipple under contract No. 2346, but were unable to furnish any additionally information. Letter from Paul D. Henze, Supervisor Engineering Services and Records Department, Roberts and Schaefer Company to the author, dated 13 August 1991.

64."West Virginia," Coal Age 9 (1924): 339; and Coal Age 18 (1924): 636.

65."West Virginia," Coal Age 19 (1925): 652.

66."West Virginia," Coal Age 15 (1926): 549; and Coal Age 16 (1926): 583.

67."Installation Provides Data on Lessened Breakage Incurred with Rope-and-Button Conveyor," Coal Age 18 (1927): 629-30. This an article discussing Ford's improvements at Nuttallburg and included are views of the Headhouse and Conveyor under construction, as well as other views.

68.Fayette County Deed Book 67, pp. 370-372; and "Ford Sells Nuttallburg Mine to Md-New River Co.," Fayette Tribune, 8 August 1928, p. 1.

69.Keystone Coal Buyers Catalog 1929 (New York: McGraw-Hill Catalog and Directory Co., 1929), p. 709.

70.1950 Keystone Coal Buyers Manual Including Directory of Mines (New York: McGraw-Hill Publishing Co., Inc., 1950), p. 610.

71."Charleston, W.Va.," Coal Age 15 (1917): 686.

72. "Maryland New River Coal Co.," Coal Field Directory for the Year 1922, pp. 1036-37.

73.Frank B. King, Chief, submitted by Julius C. Olzer, Acting Chief, State of West Virginia Annual Report of the Coal Mining Section Department of Mines January-December 1954 (n.p.: 1956), p. 17.

74.First Annual Report of the State Inspector of Mines to the Governor of the State of West Virginia for the Year 1883 (Wheeling, W.Va.: Charles H. Taney, State Printer, 1884), Table II.

75.John Cavalier, Panorama of Fayette County (Parsons, WV: McClain Printing Co., 1985), p. 336.

76.Nuttall, "Nuttall," p. 6. Edmund Post Office is still in existence as of 1991, as well as the town of Edmund.

77.Fayette County Deed Book 27, p. 58.

78.The original of this map is located at the offices of Pentree Resources, Princeton, West Virginia. The original title block was cut out and replaced with a Maryland New River Coal Company title block. The Nuttallburg Smokeless Fuel Company and or Ford was probably responsible for making the original map.

79.Jones, James B. "Buck." Interview by Paul Nyden, 23 October 1980, Oral History Collection, West Virginia and Regional History Collection (WVRHC), West Virginia University, Morgantown, West Virginia. This interview was part of a series of interview conducted to document life in the New River Gorge and was undertaken by the New River Gorge National River Park.

80.Nuttall, Trees, pp. 67-69.

81.Keith Dix, Work Relations in the Coal Industry: The Hand Loading Era, 1880-1930 (Morgantown, WV: West Virginia University, 1977), pp. 8-14.

82.Dix, Hand Loading, pp. 16-21.

83.James W. Paul, Chief Mine Inspector, Nineteenth Annual Report Coal Mining in the State of West Virginia, U.S.A. for the Year Ending June 30, 1901 (Charleston, W.Va.: The Tribune Co., Printer, 1901), p. 27.

84.Keith Dix, What's a Coal Miner to Do? : The Mechanization of Coal Mining (Pittsburgh: University of Pittsburgh Press, 1988), pp. 40-41.

85.West Virginia Mine Reports 1883 to 1920.

86.R.M. Lambie, Chief Mine Inspector, West Virginia, U.S.A. Annual Report of the Department of Mines for the Fiscal Year Ending June 30, 1920 (Charleston, W.Va.: The Tribune Printing Co. 1921), p. 84.

87.R.M. Lambie, Chief Mine Inspector, West Virginia, U.S.A. Annual Report of the Department of Mines for the Fiscal Year Ending June 30, 1921 (Charleston, W.Va.: The Tribune Printing Co., 1922), p. 88.

88.R.M. Lambie, Chief Inspector of Mines, West Virginia, U.S.A. Annual Report of the Department of Mines 1930 (n.p., 1931), p. 57.

89.Jones, interview, 23 October 1980.

90.Dix, Coal Miner, p. 188.

91.Dix, Coal Miner, pp. 181-190. Jones interview by Nyden, 23 October 1980. Mr. Jones states that Nuttallburg was organized in 1930 or 1933, but clearly the 1933 date is more accurate.

92.Dix, Coal Miner, pp. 194-97.

93.N.P. Rhinehart, West Virginia, U.S.A. Annual Report of the Department of Mines 1936 (Charleston, W.Va.: Jarrett Printing Co., 1937), pp. 20-21.

94."The Joy "15-CC" Portable Conveyor," Coal Mining Catalogs Including Directory of Manufactures and a "Where-to-buy-it-Nearby" Directory 1941 (New York: McGraw-Hill Publishing Company, Inc. 1941), p. 66.

95.Keystone Mining Catalog 1928, pp. 346-47.

96.This view is included in Coal Age 12 (1927): 427.

97."The Mining Safety Device Co.," Keystone Mining Catalog 1928 (McGraw-Hill Catalog and Directory Company, Inc., 1928), pp. 416-18.

98.Ibid, pp. 489-95.

99.Fayette County Deed Book No. 67, p. 372. Part of the lease agreement between the Fordson Coal Company and the Maryland New River Coal Company was Maryland New River's assumption of Fordson's contracts, which included a contract between Fordson and Street-Amet Weighing and Recording Company dated 29 June 1923, for a "weighing attachment known as an Indicating and Recording Attachment." For additional information see "The Development of the Streeter-Amet Weighing Recorder," Modern Mining 5 (1927): 137;

and "Streeter-Amet Weighing and Recording Co.," Keystone Coal Mining Catalog 1928, (New York: McGraw-Hill Catalog and Directory Co., Inc., 1928), p. 562.

100.Another possibility was the run-out track fed back into the main bench level track and the empties were brought back to the mine, not through the Headhouse but on the main track.

101.Jones, interview, 23 October 1980.

102.Wire rope is generally composed of 6 strands, with each strand composed of 19 individual wires wound together. The lay of a rope refers to the ropes twist, that is, left lay has a left hand twist, while regular or right lay has a right hand twist. In this case alternate regular and Lang lay means 3 strands have a right lay, while the other 3 strands have a left lay, and are wound together to form rope.

103."Installation," Coal Age 18 (1927): 629-30.

104.Keystone Coal Mining Catalog 1928 (New York: McGraw-Hill Catalog and Directory Co., Inc., 1928), pp. 232-33.

105.David R. Mitchell, Coal Preparation (New York: The American Institute of Mining and Metallurgical Engineers, 1943), p. 168.

106.Nuttall, Trees, p. 80. For a view of the original Nuttall Tipple see Trees, no page number.

107.Mitchell, Coal Preparation, pp. 127-31.

108."Nuttallburg Smokeless Fuel Company," The Coal Catalog Combined With Coal Field Directory for the Year 1922 (Pittsburgh: Keystone Consolidated Publishing Co., Inc., 1922), p. 1127. The Tipple view referred to was used to illustrate the above article as well several other Nuttallburg photographs.

109."Efficient Surface Plant at North Diamond Mine," The Coal Industry 8 (1923): 361.

110.Mitchell, Coal Preparation, pp. 134-35.

111."Preparation of Coal: The Factors Which Led to the Present Practice of Cleaning and Sizing Coal; Anthracite and Bituminous Preparation," The Mining Catalog 1923, p. 172.

112.Mitchell, Coal Preparation, pp. 712-16.

113."Maryland New River Coal Company," 1952 Keystone Coal Buyers Manual (New York: McGraw-Hill Publishing Company, 1952), p. 416.

114.Ibid, p. 672.

115."Kanawha Manufacturing Company," Coal Mining Catalogs Including Directory of Manufacturer and a "Where-To-Buy-It-Nearby" Directory 1941 (New York: McGraw-Hill Publishing Co., Inc., 1941), p. 135.

116.Mitchell, Coal Preparation, pp. 460-61.

117.For this view see William E. Cox, Life on the New River: A Pictorial History of the New River Gorge (Washington, D.C.: Eastern National Park and Monument Association, 1987), p. 12.

118.Charles Singer, et al, ed, The History of Technology, Vol IV: The Industrial Revolution c1750 to c1850 (London: Oxford University Press, 1958), pp. 89-91.

119.Nuttall, Trees, p. 68; and "Origins and Development of the Ventilating Fan," Coal Age 15 (1918): 690-91.

120.Paul, Nineteenth Annual Report, p. 205.

121.James W. Paul, Chief Mine Inspector, Twentieth Annual Report Coal Mines in the State of West Virginia, U.S.A. for the Year Ending June 30, 1902 (Charleston, W.Va.: The Tribune Printing Co., 1903), p.232; James W. Paul, Chief Mine Inspector, Twenty-First Annual Report Coal Mines in the State of West Virginia, for the Year Ending June 30, 1903 (Charleston, W.Va.: The Tribune Printing Co., 1904), p. 236; and John Laing, Chief Department of Mines, West Virginia, U.S.A. Annual Report of the Department of Mines for the Year Ending June 30, 1909 (Charleston, W.Va.: News Mail Co., Printers, 1910), p. 473. The are some discrepancies about the powering and size of this fan. The 1908 report states the fan is electric while all the other reports state that it was steam powered, which is the conclusion the author has drawn. Some reports say the fan is 18 feet in diameter, others 16 feet. There is no clear indication as to its actual diameter.

122.Earl A. Henry, Chief Department of Mines, West Virginia, U.S.A. Annual Report of the Department of Mines for the Year Ending June 30, 1914 (Charleston, W.Va.: Tribune Printing Co., 1915), p. 228.

123."Fan Speed Is Controlled From Inside of the Mine," Coal Age 10 (1927): 368-69. Included are several views of the Fan House and the operating equipment.

124.The Fan House as of the summer of 1991 was scheduled to be removed and the mine opening by the Office of Surface Mining, due to the deteriorated condition of the structure and the collapsed roof.

125."Maryland New River Coal Co.-Dubree No. 4 Mine," 1952 Keystone Coal Buyers Manual (New York: McGraw-Hill Publishing Co., Inc., 1952), p. 672.

126.James W. Paul, Chief Mine Inspector, Nineteenth Annual Report on Coal Mines in the State of West Virginia, U.S.A. for the Year Ending June 30, 1901 (Charleston, W.Va.: The Tribune Co., Printers, 1901), p. 205; and The Coal Field Directory and Mining Catalogues of Coal Mining Equipment for the Year 1915 (Pittsburgh: Keystone Consolidated Publishing Co., Inc., 1915), p. 647.

127."Substation Changed with No Loss of Time," Coal Age 4 (1926): 164.

128.John A. Garcia, "Laws That Prescribe Ventilation Vary Widely," Coal Age 16 (1926): 528-30.

129."Installation," Coal Age, p. 630; and R.E. Powers, "Automatic Substations in Coal Mining," Modern Mining 5 (1927): 145-52.

130."Screen Above Dry-Sand Bin Can Be Swung Clear," Coal Age 12 (1926): 471. This article also includes a view of the sand drying apparatus.

131."Maryland New River Coal Co.-Dubree No. 4 Mine," 1943-44 Keystone Coal Buyers Manual including Directory of Mines (New York: McGraw-Hill Publishing Co., Inc., 1944), p. 286. This was the first year that dustless treatment was listed in the Keystone Catalog, and was offered by Maryland New River until they ceased operations in 1955.

132.A photograph of this structure is in the New River Gorge National River Headquarters Library, Glen Jean, West Virginia, Photograph Collection, under "Towns-Nuttallburg" which identifies this building as a general store below and a furniture store above.

133.Fox, Paul. Interview by Lee R. Maddex, 31 May 1991. Paul Fox is a lifetime resident of Edmund, West Virginia and a former miner.

134.Nuttall, Trees, p. 58.

135.Photograph is in the Photograph Collection at the New River Gorge National River Headquarters. NERI Negative No. 1639. This view is apparently from a Red Ribble panoramic view taken at Nuttallburg in the 1930s. Ribble is noted for taking panoramic views in the southern West Virginia coal fields.

136.This information is based on the 1922 Nuttallburg map and informal conversations the recording team had with local residents who came to the site during the summer of 1991 to fish and camp.

137.Paul, Nineteenth Annual Report, p. 205.

138.W.R. Chedsey, "Locomotive Haulage," The Mining Catalog (Coal Edition) for the Year 1923 (Pittsburgh: Keystone Consolidated Publishing Co., Inc., 1923), pp. 661-62.

139.The Coal Catalog Combined with Coal Field Directory (Pittsburgh: Keystone Consolidated Publishing Co., Inc., 1924), p. 986.

140. "Some Light Highway Suspension Bridges," The Engineering Record, 3 February 1900, p. 99; and Henry G. Tyrell, History of Bridge Engineering (Chicago: The G.B. Williams Co., Printers, 1911), p. 249.

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